Proceedings

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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INDO-PACIFIC FISHERIES COUNCIL

PROCEEDINGS

5TH MEETING
BANGKOK
THAILAND
22nd January–5th February, 1954

SECTION I

IPFC Secretariat, FAO Regional Office
for Asia and the Far East,
Bangkok
1954

OFFICE-BEARERS OF THE INDO-PACIFIC FISHERIES COUNCIL, 1954/55

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Burma ..	U Ba Kyaw	U Thike Tun.
France ..	Monsieur M. P. Legand.	Monsieur R. Serène.
India ..	Dr. N. K. Panikkar (*Chairman*)	Dr. D. Bhatia.
Indonesia ..	Mr. Hasanuddin Saanin.	Mr. G. M. C. Kasuma.
Japan ..	Mr. K. Kuronuma.	—
Korea ..	Mr. Soon Kyo Kim.	Mr. Jeung Keun Han.
Netherlands ..	Mr. D. C. Zwollo.	Mr. C. J. Bottemanne.
Pakistan ..	Dr. Nazir Ahmad.	Dr. M. R. Qureshi (*Chairman*).
Thailand ..	Nai Chote Suvatti.	Major-General Mom Sanitvongseni
U.K. ..	Mr. Tham Ah Kow.	Mr. Au Lai Shing.
U.S. ..	Mr. E. H. Dahlgren.	Mr. L. S. Christey.
Vietnam ..	Monsieur Nguyen Nhu Nghi.	Monsieur Tran Van Tri.

* The Office of Secretary to the Council is currently discharged by the F.A.O. Regional Fisheries Officer for Asi and the Far East.

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AGENDA FOR 5TH MEETING

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C. Election of Chairman and Vice-Chairman for the Ensuing Period.

D. Any Other Business.

SUMMARY REPORT OF THE 5TH MEETING

The 5th Meeting of the Indo-Pacific Fisheries Council was opened by His Excellency Field-Marshal Phin Chunahavan, Minister of Agriculture and Deputy Prime Minister of Thailand, at 3.00 p.m. on the 22nd of January, 1954, in the Conference Room, Santitham Hall, Bangkok. He stated that the Government of Thailand had taken a keen interest in the aims pursued by the Council ever since its formation in 1948 and had, in fact, been one of the early signatories to its Agreement. In the firm belief, therefore, that the principles on which the Council was based would be of the greatest utility to Member Governments in shaping their fisheries programmes and in solving their food problems, he was pleased to welcome the delegates of the Member Governments of the Council to Thailand. The Minister added that, although the countries of South and East Asia were now for the first time achieving a rice production comparable to that of pre-war years, it could not yet be said that the threat of hunger and hardship had been defeated ; the need for food still had to be converted into an effective demand through sound marketing principles, so that the people might have a healthy, balanced diet, and the consumption of fish, which was the chief source of animal protein in many Asian countries, needed to be increased. Finally, the Minister stated that it was his Government's policy to co-operate in every way with the aims of the Council and he expressed his best wishes for the success of the Meeting.

A message of welcome from His Excellency Field-Marshal P. Pibulsonggram, President of the Council of Ministers of Thailand, was then read, in which it was stated that as a member of the Indo-Pacific Fisheries Council, the Thai Government fully realized the importance of the Council's activities as a centre of technical knowledge for the purpose of promoting the production of food.

An address was delivered by Mr. W. H. Cummings in the name of the Director-General of F.A.O. He stressed that the existence of the Council had coincided with the period in office as Director-General of F.A.O. of Mr. Norris E. Dodd, who had followed the growth and work of the Council from its commencement, and it was noteworthy to recall that the first regional undertaking of the F.A.O. in Asia and the Far East had been in the field of fisheries. Since then much progress had been made and the results achieved warranted confidence in greater achievements in the future. Finally, the Director-General suggested that the Council accept as one of its guiding principles the following part of the fisheries resolution taken at the recent Conference of F.A.O. held in Rome, in November, 1953.

> " The Conference wishes the Director-General to take into account its view that projects likely to effect quick results, such as the promotion of fish cultural practices, improved management of inland fisheries, work towards the improvement of fishing boats, landing, marketing and distribution facilities, fishing gear and methods especially in countries where there is need to increase protein food supplies for indigenous population, should be given preference."

The Chairman, Monsieur R. Serene, replied thanking the Minister and the Prime Minister, and expressing the Council's desire to extend a message of greeting to His Majesty the King of Thailand and its cordial wishes to his loyal subjects. Monsieur Serene commented on the excellent facilities provided by the Government and the magnificent building which had recently been erected for the holding of such international meetings.

Turning to the delegates, the Chairman welcomed those delegates who had not previously attended the Council's Meetings and regretted the absence of a few old friends whose presence would be missed ; like all living organisms, however, the Council must at each Meeting renew its component parts and thus complete a further stage of its evolution. Finally, the Chairman presented the chief delegates of Member Governments to the Minister of Agriculture.

A. PROCEDURAL ITEMS

1. Adoption of the Agenda

The adoption of the Agenda was proposed by Mr. D. W. Le Mare (U.K.), seconded by U Ba Kyaw (Burma) and carried unanimously.

2. Report on Credentials

The Secretary reported that satisfactory credentials had been received in respect of 13 delegates, 9 alternates, 16 advisers and 5 observers (one of whom was acting in a dual capacity), making a total of 43 officially accredited participants. This represented a quorum for all purposes under the terms of the Council's Agreement and Rules. Subsequent to issuing this certificate, one further accredited alternate (France), and one additional accredited adviser (U.S.) were registered, making a total of 45 in attendance at the Meeting.

3. Statements of Delegations

The Chairman then invited the delegates to make their opening statements. All delegations expressed hearty thanks to the Thai Government for its invitation to hold the Council's 5th Meeting in Bangkok.

The Delegate for *Australia* conveyed the greetings of his Government and stated that his Government's policy since the Council's foundation to cooperate in fisheries matters with nations in the area would be continued. He regretted the unavoidable absence of Mr. D. J. Rochford, Chairman of Technical Committee I.

The Delegate for *Burma* stated that since it would appear that the inland fisheries of Burma have already been exploited to a considerable extent, the Government of Burma realizes the necessity to pay more attention to the marine resources in order to satisfy urgent nutritional requirements, and several programmes are being actively considered. In order to implement these programmes, the Government is in urgent need of technical personnel from overseas to work in the country for a reasonable period of time until an adequate fisheries staff may be trained. It was hoped that the Government's request to F.A.O. for a fisheries mission would receive sympathetic consideration.

The Delegate for *France* stated that his Government has a keen interest in the work of the Indo-Pacific Fisheries Council both as regards Technical Assistance to Cambodia, Laos and Viet Nam and fisheries development in the French administered territories in the region. The view was stated that in the fields of both marine and inland fisheries, it might be dangerous to attempt a separation between pure and applied research and that the oversimplification of the Council's work might reduce the Council to a mere technical committee. It is not merely a matter of supplying the countries' immediate needs, but also assisting to obtain a level of scientific and technical development which will permit them to carry on their own investigations.

The Delegate for *India* stated that his Government had given increasing attention to the development of inland and marine fisheries resources and had adopted a 5-year plan. In addition to the Indo-U.S. Technical Assistance programme, there is the further cooperative effort between Norway and India under the auspices of the United Nations, consisting of a community project aimed at the integral development of a small zone in Travancore-Cochin. Experimental fishing including the introduction of mechanized gear has now reached the stage where the training of master fishermen in the region becomes an urgent necessity if these projects are to be effective.

The proposed Co-operative Research Proje on Hilsa which had been brought up at the 4 Meeting of the Council would, it was hoped, developed at an early date so soon as replies to t offer made by India might be received from t other countries concerned. The Government India has two organizations for inland and mari fisheries research at Calcutta and Mandapam re pectively and a Journal would shortly be publishe

Finally, it was hoped that the simplification procedures suggested at the 4th Meeting and r ported on by the Secretariat might prove effecti and that the Council's functions might now be e tended to include actually carrying out a few specif projects, since otherwise the Council might becor a mere fact-finding body.

The Delegate for *Indonesia* believed that t Council's Meetings since 1948 have proved em nently beneficial to the countries of the region ar deepest appreciation of the Council's efforts w expressed. The two seminars on fish culture he at Bogor might be said to constitute Indonesia contributions to the Council's aims. The shorta of staff following the sending of trainees abroad h made it difficult to contribute on a larger scale the Council's work. It was hoped that the plans hold further training courses under the auspices the Council might be successful and the Indonesi Government planned to send trainees to the courses. The Government renewed its offer render any services within its capacity in connecti with the 3rd Seminar on Fish Culture proposed be held during the period 1954–55.

The Delegate for *Japan* stated that his Gover ment, since it became a member of the Indo-Paci Fisheries Council in 1952, has made every effort foster the aims of the Council. It was believ that the exploitation of the fisheries should mar hand in hand with proper conservation and utili tion and that this type of work can only be achiev in the long run through scientific research.

The Delegate for *Korea* stated that his coun depends largely on marine products and takes keen interest in fisheries development in the regi A delegation has been sent to each Meeting of Council despite of the prevailing war conditio It was believed that the valuable conclusions of Council's past four Meetings have accelerated progress of the fisheries in Korea as well as in ot countries. The Government of the Republic Korea would therefore continue to give its utm cooperation to the Council.

The Delegate for the *Netherlands* stated that Council's past experience had resulted in the c lection of much information of a descriptive nat

which has facilitated an evaluation of the fishing industries, and the Council should now be in a better position to assess the problems. It was the opinion of the Government of the Netherlands that priority should be given to aspects having a direct bearing on the fishing industries and especially to those which might be expected to give results in a reasonably short period. Although it is true that all the biological, technical and economic aspects must be borne in mind, the immediate necessity is for improvement in fishing gear, fishing vessels, and fishing methods. It must, however, not be forgotten that the fisheries industries form a composite structure and that it was not advisable to develop any one aspect to the exclusion of others.

The Delegate for *Pakistan* stated that his Government appreciated the work performed by the Council and hoped that it might become possible to develop mutual co-operation to a greater extent. It was believed that the basic requirements in underdeveloped countries were the preparation of reliable statistics and the mechanization of fishing craft, but that this development should be gradual and should be accompanied by improved marketing and transportation facilities. Since there is a shortage of master fishermen in the area, a centre for the training of these operatives was urged. Finally, the belief was expressed that little could be achieved in fisheries development until there was an improvement in the living conditions of the fishermen themselves.

The Delegate for *Thailand*, on behalf of his Government, extended once again a hearty welcome to the representatives of other Member Countries and gave his assurance that it was his Government's wish to render all possible facilities both to the Council and to the delegates during their stay in his country. He was happy to report a rapid expansion of fisheries programmes throughout the Kingdom, and the establishment of a new wholesale fish market. Further knowledge was required of the fisheries resources of the country, for which more trained personnel was essential. The specific problems appeared to be (1) improvement of fish culture techniques, (2) stocking of fish in inland waters including rice fields, (3) possible effects of hydroelectric projects on the fisheries, (4) improvement of fishing gear and methods, including simple mechanization of local craft, (5) production of fish meal and other by-products, (6) improvement of living standards of fishermen, (7) cooperative and marketing systems and (8) the training of technicians. It was hoped that these problems could receive the consideration of the Council.

The Delegate for *United Kingdom* stated that his Government has cooperated in the aims of the Council since its inaugural meeting in 1948. The principal advances in the fisheries of British territories in the region are set forth elsewhere. Three prototype vessels have been constructed at the new shipyard which, it was believed, might substantially contribute to the fisheries of the region. A Fisheries Research Unit had been created at the Hong Kong University and a research vessel had been constructed. It was hoped that the results might shortly be made available to Member Governments. He emphasized that his Government was looking not only for immediate results but also at the long-term aspect over the next 20 years or so.

The Delegate for the *United States* said that his Government appreciated the opportunity to bring before the Council some of the problems which might be solved by cooperative action ; members of his delegation would also be participating in the Symposium on Plankton. It had been stated that the sea was man's last frontier but it had also been argued that the real frontier was not the sea, but rather the border between knowledge and ignorance. It was therefore necessary to discuss the present state of knowledge and to recognize those fields in which knowledge is lacking. In particular, we must seek new means of finding and educating researchers, and of supporting biological investigations over sufficiently long periods of time. Increased production would result from the development of a new fisheries science which is really a form of husbandry. These aspects cannot yet be fully investigated because of the lack of information on the biology of the sea. One of the problems which was foreseen by the U.S. Government was that of the apparent changes in faunal distribution which were taking place throughout the world. Climatic changes occurring in one area might profoundly affect the fisheries of others. The fisheries literature is only now beginning to reflect a wide recognition of these changing conditions and it was believed that a world-wide study of these was an urgent necessity. It was hoped that this Meeting of the Council might be even more productive than those held in previous years and contribute to the solution of the problems through co-ordinated effort.

The Delegate for *Viet Nam* stated that his country was making every effort to rebuild the fisheries industries which were still suffering from war-time conditions. His Government was taking all possible steps through the recently formed fisheries service to remedy these conditions through opening authorized fishing zones, assistance to fishermen in obtaining materials, and a socio-economic pro-

gramme. Fishing boats have been provided through American aid and two fish culture stations have been constructed. The Viet Namese Delegate would welcome any suggestion which the Council might make for the improvement of the fisheries and Viet Nam has every interest in implementing the resolutions of the Council.

The Chairman then introduced Dr. A. Wolsky, Head of the UNESCO Science Co-operation Office for South East Asia, who communicated a message of greetings from his Director-General and stated that his Organization had been happy to co-operate in assisting prominent plankton workers to travel to Bangkok to take part in the jointly sponsored Symposium on this subject. UNESCO has always held a keen interest in the Council's work and had been represented at many of its meetings.

Dr. Ernest Hess, Chief of the Technology Branch, Fisheries Division of FAO, Rome, communicated the greetings of the Director of Fisheries Division, FAO, Rome, who had unfortunately found it impossible to be present in person. Since biological science had both in the past and at this Meeting been adequately represented, it was believed that Dr. Hess might be of assistance to the Council on the Technology side.

Dr. Hess then read a message of greeting from Professor Umberto d'Ancona, Chairman of the General Fisheries Council for the Mediterranean.

Dr. Shen-yi, observer for the United Nations Organization, stated that the Indo-Pacific Fisheries Council of the Food and Agriculture Organization and the Economic Commission for Asia and the Far East of the United Nations were working to the same end, the promotion of economic development in the region. He cited as an example the co-operative efforts of FAO and ECAFE in dealing with the important problem of water resources development. The control and utilization of water, if not properly planned, designed and operated may be detrimental to the inland fisheries. It is only through cooperative effort that a proper development of the two resources can be achieved ; such common problems being tackled include the means whereby the life history of the fishes may be investigated in order to ascertain to what extent they might be affected by the new conditions ; the methods available to remedy any deleterious consequences arising out of development schemes; the controlled use of explosives in hydraulic projects ; the controlled diversion of flow from rivers; proper operation of reservoirs, etc. Another subject of common interest was the eradication of weeds in irrigation canals.

4. Report of the Executive Committee

The Report of the Executive Committee for th period since the 4th Meeting was studied, item b item. (See pp. 25-41), together with the Sec retariat Study of Council Work and Procedur (p. 42) and the Report on the Status of the In dustry (p. 46).

4.1. *Publications and Bibliography*

The Council reviewed the progress in the fiel of Council publications. It was believed that th policies laid down at the 4th Meeting represente a long-term programme to be implemented over number of years.

The synopses of the proposed handbooks o "The Culture of Warm Water Fishes" and "Th Principles of Fish Handling and Processing Fisheries Products", submitted by the General Edito of Handbooks, Dr. G. L. Kesteven, were studied an generally approved. It was suggested that in bot the Handbooks a glossary, a classified list of referenc and an index should be included and that each han book should have a glossary and index of its ow rather than that a separate dictionary and gener index should be published. The Report of th General Editor of the IPFC Handbooks was examine in detail. It was felt that it should not be laid dow as a general rule that descriptions of phenomena l avoided in Handbooks. There is an urgent nee for critical reviews of existing fishery practices the region and descriptions of improved metho for the use of fishery administration and extensi workers ; such publications would therefore of immediate use in the region. It was fe that if such descriptive material cannot be includ in the Handbooks themselves separate suppleme tary publications on the lines indicated above shou be considered.

In view of the increasing demand for t Council's publications, the Council recommend that the Proceedings as well as the Special Pub cations and separates be priced. It was al recommended that the possibility of the Coun establishing an accumulating publications fund investigated.

The synopsis of the Handbook on Field Metho in Fisheries Work was examined and it was reco mended that Section 2 (7) should also deal w amphibia and aquatic reptiles and mammals.

As regards Volume III of the Handbooks (Fish Statistics) the Council felt that there is sufficie interest among workers in the region to warra the immediate preparation of Sections III, IV a V and the availability of such a Handbook wo induce further interest in the subject.

4.2. *Council Work and Procedure*

The Council examined the Study of Council Work and Procedure prepared at the 4th Meeting, the Secretariat study arising therefrom, the introductory remarks in the Report of Technical Committee I and the Secretary's Review of Documentation at Meetings.[1] It was agreed that the work of the Council might, in the future, be advantageously conducted at Council Meetings if Technical Committees I and II were each to split into only three groups, to be known as Panels, as follows :

Technical Committee I	Technical Committee II
A. Inland Fisheries	A. Craft and Gear
B. Sea Fisheries	B. Food Technology
C. Miscellaneous Fisheries	C. Socio-economics and Statistics

The terms of reference of these Panels are to be as follows :—

Inland Fisheries : Fish Culture, including Chanos Culture ; Capture Operations in the freshwaters, including Hilsa and other species migrating into freshwaters ; Taxonomy and Bio-statistics of these groups.

Sea Fisheries : Oceanic Fisheries ; Neritic-Pelagic Fisheries ; Demersal Fisheries ; Estuarine Fisheries ; Taxonomy and Bio-Statistics of these groups.

Miscellaneous Fisheries: Hydrology ; Plankton ; Minor Fisheries ; Seaweeds ; Taxonomy of these groups ; Taxonomic Method.

Craft and Gear : *Sui generis*

Food Technology : *Sui generis*

Socio-economics and Statistics : Socio-economic conditions of fishermen as they affect the fisheries ; socio-economic problems of consumption ; marketing, transportation ; statistics.

It was agreed that nothing should prevent the formation of *ad hoc* Sub-Committees by Panels, but that the responsibility to report to the Council lay with the Technical Committees.

Panels would be constituted at Meetings from Members of delegations, including advisers, for the purposes of discussions during Meetings ; the Panel Chairman should be elected from this group and should be prepared to carry out the continuing duties of his office during the interval between Meetings.

Around this nucleus, Governments might be invited to nominate for co-option workers not present at the Meeting. The Secretary would, subsequent to the Meeting, inform Governments of the proposed establishment of these Panels and of the tasks assigned to them and would seek Governments' assistance for their effective working, requesting that the Secretariat be informed in case any of the workers nominated to the Council's Panels were unable to work on the Council's assignments during the ensuing period.

It was believed to be advisable, wherever possible, that periodic meetings should be called of the members of the Council's different panels in a particular country, to assess progress.

It was emphasized that the Panels should be prepared to pursue all such activities as have heretofore been undertaken by the Council's Sub-Committees.

Turning to the simplification of documentation, it was proposed that the above panels should make recommendations as to the types of technical papers which should be invited for consideration at the next Meeting ; that wherever Government administration so permits, papers be submitted only on these proposed subjects ; but that manuscripts on other topics should continue to be accepted from Governments which, owing to limitation of personnel, were in a position to submit contributions on a limited number of subjects.

It was agreed that a time limit of two months prior to the commencement of the Meeting be established for the receipt of technical contributions by the Secretariat and that papers received after that date might be read in title only.

It was believed that the maximum possible number of working papers continue to be incorporated into the Executive Committee's report, but since this procedure might lead to delay in producing this document, the Committee's Report should be prepared and circulated to Governments omitting the section on the Status of the Industry, which should be prepared separately ; that, nevertheless, Governments be requested to supply information on the status of their fisheries to the Secretariat at least two months prior to each Council Meeting, for the preparation of the second document.

The Council, having re-examined the concepts put forward at the 4th Meeting, agreed that there was not sufficient evidence to show that any advantage would accrue from holding alternating Meetings between a host country and the site of the Secretariat.

[1] Not published here.

As the Council had now been in existence for nearly six years, and Member Governments concerned had from time to time requested some form of report on the activities of the Council and the results achieved from its activities, the Council directed the Executive Committee to draw up for presentation at the Sixth Meeting of the Council a full and complete review of the work of the Council and the results both direct and indirect that have followed.

It was suggested that the review might be divided into two parts :

1. A Statement by the Executive Committee of the present status of Resolutions and Recommendations adopted by the Council in full session. This could be supplemented if desired by an analysis of procedural methods and their modifications for the administration of the work of the Council, prepared by the Secretariat.

2. Statements from the Member Governments assessing the influence of IPFC activities in their respective countries, and including suggestions for the future development of the Council's activities along lines considered to be most generally beneficial.

It having been brought to the attention of the Council that certain language difficulties are experienced, particularly by the members of the Delegation from Viet Nam, in satisfactorily participating in the work of the Council at meetings and in endeavouring to carry out the projects recommended by the Council, the Council directed the Executive Committee to examine the possibility of providing the Secretariat with facilities whereby the more important papers of the Council might be translated into the French language.

The Council, recognizing the merits of the FAO Conference Resolution quoted in the Report of the Executive Committee especially the endorsement of projects likely to effect quick results, including promotion of fish culture and improvement of craft and gear, resolved that the Director-General and the Fisheries Division of FAO should be requested to consider, within the approved budget, the possible redistribution of funds and personnel to strengthen the technical staff of the FAO Regional Office for Asia and the Far East by assigning specialists on gear and craft, food technology and fish culture to provide advice and assistance toward the immediate and practical application of improved methods. (See Resolution No. 5, p. 17.)

In view of certain procedural difficulties which had arisen at this and other Meetings, the Secretariat was instructed to prepare a brief Manual on Parliamentary Procedure adapted to the Council requirements.

Finally, the Council commended the caref attention given by the Executive Committee an the Secretariat to the problem of procedure and the implementation of the Council's directiv given at its 4th Meeting in this respect.

Other items of the Executive Committee's repo were referred to the Technical Committees and a dealt with under the corresponding headings.

5. Proposals for Amendments to the Agree ment and Rules

There having been no notice of proposals f amendments from Member Governments, this ite was not discussed.

6. Nomination of Technical Committe

Delegates were invited to nominate the Membe of Technical Committees I and II for the purpos of discussions at the 5th Meeting and for the e suing period. Nominations were also made, fro those present, to the Council's six panels and so workers not present at the Meeting were named f co-option to the Panels for work during the ensuir period ; in other cases, it was recommended th Governments should nominate additional co-opte workers for special purposes. (See Resolution N 1, below.)

7. Council Correspondents

A few changes were made to the list of Coun Correspondents (see p. 111). It was recommende that Council Correspondents should, where possibl be assisted and advised in each country by a com mittee of the nominees to the Council's Panel (See Resolution No. 1, p. 16.)

8. Time and Place of Sixth Meeting

The Delegate for Japan stated that he had be instructed by his Government to extend an i vitation to the Council to hold its next Meetir in Tokyo, at a time to be decided by the Coun and it was suggested that the best season for t Meeting would be either the Autumn of 1955 the Spring of 1956.

Some discussion took place as to whether t Council Meeting should be held each year or eve two years. The Delegate for India confirme the opinion of his Government expressed at pr vious meetings that the Council should meet two-year intervals. This view was supported b the Delegate for Australia. It was decided that t

Meeting should take place in October, 1955, which would represent an interval of 20 months.

It was moved by the Delegate of the U.S. and seconded by the Delegate for Pakistan that the invitation of the Government of Japan be accepted. A hearty and unanimous vote of thanks was recorded.

B. TECHNICAL ITEMS

Technical Papers Recommended for the 6th Meeting

The Council believed the type of technical papers to be presented at the 6th Meeting to be a matter of great importance as this will greatly influence the course of action of the Council.

In the opening statements, the delegates of several countries indicated that there was general agreement with the opinions expressed at the fourth Meeting regarding the functions of the Council and the types of papers suitable for discussion at its Meetings, and it was pointed out that certain papers presented at the current Meeting—as was also the case at previous Meetings—had not been directed towards the principal aims of the Council.

It was decided that technical papers for presentation at Council sessions at the next Meetings should emphasize the definition of methods of approach to the solution of problems associated with the increase or maintenance of fish production and papers relating to the following subjects were to be invited from Member Governments:

(1) The food and feeding of fishes
(2) Fisheries extension work
(3) Sampling surveys used in the production phase of fishery industry.
(4) Advances in fish marketing along with details of the equipment and technology improvements that have contributed to successful marketing.
(5) Development of consumer tastes, particularly for noncustomary products.

The papers should not be of a general nature and should contain the necessary information and background to facilitate useful discussion. When the paper is of an academic nature it should be preceded by a statement by the author as to how the paper would be of effective value to the Council. In papers which are reports for information, the introduction should state the problems faced and this should be followed by a description of the action taken and the results achieved. The abstracts should be complete and give the salient features discussed in the papers.

The Council agreed to follow the procedure adopted at the current Meeting, of classifying technical papers into: (a) those suitable for presentation in full at the Council Meeting and (b) those that should be merely tabled. The papers chosen for presentation at the Meeting should be introduced by the author or a member of his country's delegation with a brief statement of the background of the work reported and the important points brought out. The papers need not be read in full.

9. Reports of Technical Committees

These reports were carefully studied (see Sections V and VI) and are dealt with under their respective headings (pp. 8-13 & 13-15).

10/11. Technical Assistance and Technical Instruction

The Council discussed at some length the technical assistance programmes being undertaken in the Region (Agenda Item 10). It was believed that the extent of FAO/ETAP activities as set forth in the Executive Committee's Report appeared to be as great as could be expected under present conditions with the existing budget. Some concern was expressed regarding the evident concentration of programmes in some countries, coupled with the absence of assistance programmes in others.

Whatever the reasons for the limited programme, it was believed that technical assistance on a larger scale is desirable. It was suggested that the following means be considered:

(a) Member countries desiring the same types of assistance may pool their requests to FAO to provide continuous services of one or more experts. This would, presumably, be an ETAP Project.
(b) The possibility of attaching experts to the permanent staff of the Bangkok Regional Office of FAO to serve the countries of the area.

As regards the Council's programme of technical instruction (Agenda Item 11), there was general agreement as to the great value of technical instruction and it was to be regretted that funds for these activities are limited.

The Council noted with satisfaction the proposal by FAO to conduct a training course in Fish Marketing in Hong Kong in the near future and in view of the advisability, for practical reasons, that the Centre commence to operate in July, 1954, directed the Executive Committee to recommend to Member Governments that they consider the provisional nomination of prospective trainees so soon as might

be convenient. It was agreed that participating Governments should be advised as to the status, experience, ability and level of education expected from persons attending the Centre, that dispersed marketing organization should be considered, as also the Antigonish Scheme in the Maritime Provinces. It was recommended that the course be for senior officers or market managers.

The curriculum prepared by FAO was considered to be comprehensive and it was believed that the instructors should be persons with a knowledge of the special conditions of the Indo-Pacific areas.

The proposal of the Government of India (Agenda Item 12.3) "Urgent Necessity of setting up a Centre in the Indo-Pacific Region for training Master Fishermen" was discussed.

The Council believed that such training is essential to fishery development but that, for various reasons, including language, differences in fishing environment, in the educational and professional level of fishermen and in recommended methods and gear, etc., it was imperative that the training be organized on a sub-regional basis and that therefore more than one centre would have to be considered.

Although it was realized that the organization and operation of such training centres will be difficult, nevertheless it was felt that the results to be obtained should be outstanding. It was suggested that, in the event of a firm decision to go ahead with plans for such centres, other technical assistance organizations might be requested to cooperate.

It was agreed after discussion that the term "Master Fishermen" should cover operatives doing mechanized fishing in general and not the specialized Certified Masters in Fishing as understood in certain countries.

It was emphasized that the training centre should be for the purpose of stimulating the efficiency of small fishing boats through mechanization, laying greater stress on smaller vessels than on large size trawlers.

The Council therefore believed that the training course for Master Fishermen, as suggested by the Government of India, be assigned the highest priority, but that as arrangements for this training centre may take some time, the course in fisheries marketing in Hong Kong be proceeded with in 1954. It was, however, felt that the course in mechanized fishing should be started as early as can be arranged in 1955 and that the FAO should take early steps to contact possible host governments to run such a course.

As regards Statistical Training Centres, it was agreed that the results of the first course should be assessed in another year or two and the possibil of a further course on Statistics should only th be taken up. The Council felt that at the mom priority should be given to courses concerned w actual fish production and distribution rather th Fisheries Administration and that there are oth courses which are more urgent ; for instance :—

(a) A further course on Fish Culture
(b) Processing & Handling of Fish & Fish Products
(c) Socio-Economics Problems, with empha on raising the living standards of fish operatives as an integral part of natio economy, including the organization fishermen's societies and co-operativ This should be a series of courses on vari aspects.

12. Items Proposed by Member Gover ments

12.1 "Fishing in Oceanic Waters" (Gove ment of the Philippines) See p. 12.

12.2 "Fishing with Bright Lights" (Gove ment of the Philippines) See p. 12.

12.3 "Urgent Necessity of setting up a Cen in the Indo-Pacific Region for the Training Master Fishermen" (Government of India) above and Resolution No. 7, below.

13. Matters Relating to Technical Co mittee I (Hydrology & Biology)

The Council proceeded to study the pertin sections of the reports of Technical Committe

The Council directed that Technical Commit I take whatever action is practicable during ensuing period to assemble information on curr methods used in the age determination of fis in tropical areas and on the basis of the informat obtained to report to the Council on this subj at its 6th Meeting.

Panel "A"—Inland Fisheries

The Council expressed its concern in the mat of the possible adverse effects of the large num of river basin development projects on the inl fisheries of the Indo-Pacific Area and endorsed active policy pursued by the Executive Commit in cooperating with the Flood Control Bureau ECAFE of the United Nations in the matter fisheries requirements in connection with mu purpose water development. In view of the f that insufficient information regarding the biol of riverine Fsheries of the Indo-Pacific Region available and that some of the remedial measu

such as fish ladders which are in use in temperate countries have often been found to be unsuitable to the rivers of this area, it was agreed that the attention of Member Governments be drawn to the urgent need for conserving and exploiting the fishery resources associated with river basin projects by rectifying the adverse effects caused by dams and other obstructions through preventive, remedial and restoratory measures and developing fish production in the reservoirs and ancillary waters ; that the fishery requirements relating to each dam should be determined by careful survey and experimentation by senior fishery biologists and engineers without indiscriminately adopting conventional fish ladders and other measures, the suitability of which to Asiatic conditions is questionable, and that the findings arising from such investigations should be implemented. (See Resolution No. 4, page 17.)

It was noted that the Secretariat was preparing a chapter on this subject for inclusion in the Manual at present under preparation by the Flood Control Bureau of ECAFE and this should be made available to the Council. Contributed Publication No. 14 on the Fisheries of the Damodar Basin Multipurpose Development Scheme in India by Job *et al.* was recommended as a valuable contribution to the problem and it was believed that similar works on other multi-purpose projects in the area should be encouraged.

The revised synopsis of the Fish Culture Handbook was approved with certain suggested amendments.

The bibliography on *weed control* and the publication "Improving Duck Marshes by Weed Control" received from the United States Government, were recorded [Resolution C52/24.3 (12)].

In view of the information obtained from some Member Governments on the factors of *stream pollution*, it was agreed that work should now be directed towards determining the specific conditions of concentration, combinations, meteorological conditions, etc., under which the pollution factor causes actual damage to the fisheries and the extent of the damage caused by different types of pollution so that proper remedial measures could be formulated without undue prejudice to industrial interests [Resolution C52/24.3(13)]. Resolution No. C54/3 (p. 17) was passed in this sense.

Work on the *optimum combinations of compatible species* and their different size groups being necessarily of a long-term nature, such investigations should be continued for such a period as is necessary to arrive at definite conclusions [Resolution C52/24.3 (14-15)].

As a pre-requisite for the organization of an *international fish fry exchange*, the Secretariat was instructed to circulate the attached questionnaire (Table I on p. 10) to Member Governments to facilitate an approximate assessment of the resources of stocking material, local requirements of these, available surpluses and regional demands, existing as well as potential [Resolution C52/24.3(16)].

The action taken by the Secretariat in obtaining additional information on cultivable waters in the Region was noted [Resolution C52/24.3(18)].

Since considerable data relating to fish culture work are being gathered in a number of countries of this area where this work has actively been taken up, it was believed that the immediate need was for proper coordination of technical development. It was decided that the subject of food and feeding of fish be considered by the Inland Fisheries Panel during the ensuing period and that papers be invited from Member Governments for presentation at the 6th Meeting and possibly for a Symposium at a later Meeting.

The Council considered at length a communication from the Government of India regarding the introduction of *Tilapia* into Indian waters.

The Council commended the cautious approach of the Indian Government in the matter of introduction of *Tilapia*, since previous cases of introduction of the fish in the waters of this Region had not been preceded by exhaustive preliminary trials.

In view of the fact that consignments of *T. mossambica* are already available at Mandapam and Madras in India and that the general merits of Tilapia as a culturable fish have duly been recognized in that country, a final decision on the question of the desirability of introducing the fish into Indian waters would depend on two factors:

(1) the yield from Tilapia per unit of effort as compared with other culturable species available in India particularly the allied Cichlid, *Etroplus suratensis*, and
(2) the positive danger, if any, to existing fisheries.

Both the above issues could be decided only by field experiments in the different types of Indian waters, although regarding (2), the scepticism regarding Tilapia which was understood to exist

TABLE I

Inventory and Exchange Service of Fish Stocking
Material available or required

Country.....

Name of cultivable species available for outside distribution*	Present quantity available	Potential quantity on demand
1.		
2.		
3.		
4.		
5.		

Name of cultivable species needed from outside sources	Present quantity needed	Potential quantity needed
1.		
2.		
3.		
4.		

Are you in favour of a Centralized Distribution Service for Fish Stocking Material for the Indo-Pacific Regior

If yes, why ?.....

.....

.....

.....

If no, why ?.....

.....

.....

.....

Other comments.....

.....

.....

.....

.....

Signature

Designation

*If you have cultivable species but could not distribute to outside countries list such species also.

among certain Indonesian and Chinese fish farmers appeared to be exaggerated. Although when Tilapia is reared with carps and Chanos, the yield of the latter is somewhat reduced, this is compensated in poundage by the Tilapia yield. However, the monetary returns show some difference since Tilapia fetches comparatively a lower price than carps and Chanos. Tilapia is specially indicated in areas where other regular fish culture is not established. The fish is noted to be predatory on young stages of prawns. Besides this, there is no record of Tilapia causing positive injury to other fisheries.

In the circumstances, it would be best to await the outcome of the field experiments referred to above before the fish is freely released into the inland waters of India.

With regard to *Hilsa*, it was noted that the Inland Fisheries Panel would form an *ad hoc* Sub-Committee to continue to work towards the implementation of the recommendation made by the Council at its 3rd Meeting that co-operative action should be undertaken by the Governments of Burma, India and Pakistan, to which the Hilsa Sub-Com-Committee had directed its attention during the past two interim periods ; that nominations were to be invited from Governments and that India's nominee would be rapporteur.

It was noted that a programme for the development of the Hilsa investigation has now received general acceptance by the Member Governments concerned and that the problem of the formation of an international co-operative research unit and further study of Hilsa is still under consideration. The Council therefore directed the Executive Committee to inquire of the Member Governments concerned whether they contemplate approaching FAO with a view to the implementation of the proposal to establish the Unit and to initiate action in terms of the accepted programme.

The report by Technical Committee I on *Chanos chanos* was noted. It was felt that Resolution C52/24.3(2) defines a continuing programme. It was noted that an *ad hoc* Sub-Committee would be constituted under the Inland Fisheries Panel to deal with this fishery and interested Member Governments would be invited to nominate specialists to this Sub-Committee to continue to act within the original terms of reference of the Sub-Committee, particularly in relation to Resolution 24.3(2) passed at the 4th Meeting and which should give priority to the study of :

(a) biology and specifically the breeding of *Chanos*

(b) the extension of the pond culture of *Chanos* to include the utilization of inland waters.

Panel " B "—Sea Fisheries

The report of Technical Committee I on Tuna Fisheries was reviewed.

The Council confirmed the need for continuing work in terms of Resolution C52/24.3(3) and suggested that particular emphasis might be placed on :—

(a) compilation of morphometric data
(b) tagging experiments
(c) development of exploratory fishing operations.

It was agreed that Dr. Royce should be commended for his energetic work on this Sub-Committee. It was further agreed that the U.S. Government should be requested to nominate a specialist for co-option to the Committee for the interpretation of such data as may be provided by the several Member Governments on the studies of racial composition of the tuna stocks and of their ecology.

The publication ' Tuna Marking ' by R. C. Wilson, California Fish and Game, Volume 39, No. 4, San Pedro, California, October, 1953, was received.

In regard to the future programmes of the Council and its Member Governments on Tuna Fisheries, the Council recommended :—

(a) That continuing efforts be made by the Member Governments to obtain morphometric data on the several species of oceanic tunas, especially in the Indian Ocean region.

(b) That continuing efforts be made by the Member Governments to obtain information on all phases of the ecology of the tunas.

(c) That Member Governments be encouraged, in view of the successful tagging technique reported above, to initiate tagging operations so as to establish the migration patterns and the interrelations between the stocks of tunas in the region.

(d) That, since it is evident that great resources of tuna are available throughout the Indo-Pacific region, Member Governments be encouraged to initiate exploratory fishing operations for these fisheries.

Agenda Item 12.2 submitted by the Philippine Government, " Fishing with Bright Lights ", was considered by the Council, together with a communication received on the subject from the General Fisheries Council for the Mediterranean. Because there are no data to demonstrate that the use of bright lights in fishing is detrimental to the stocks, and because many important fisheries in the Region are dependent on the use of such lights, it was agreed that the use of lights in fishing should not be discouraged at present.

In the matter of Agenda Item 12.1 " Fishing in Oceanic Waters ", submitted by the Philippine Government, because no working paper was presented, and no delegate from the Philippines was present to offer any explanation, it was agreed to postpone this issue until it shall have been further clarified.

The Council reviewed the report of Technical Comittee I on the *Pelagic Neritic Fisheries* and confimed the need for continuing work in terms of Resolution C52/24.3 (8) and suggested that particular emphasis might be placed on attempts to discover the extent of pelagic neritic fish stocks.

In view of the large number of species which fall within the category of pelagic neritic fisheries, and the shortage of scientific personnel available to many of the Member Governments, it was the opinion of the Council that greater progress would be achieved if studies were concentrated on one fishery at a time. In this connection it appears that the *Rastrelliger* fishery is one which is of prime importance to most Member Governments in Zone I as defined in the previous year's report of the Sub-Committee. It was emphasized that this did not mean that the Council did not encourage investigations on the other pelagic neritic fisheries.

There was general agreement that co-operative research on Rastrelliger was highly desirable and it was noted that an *ad hoc* Sub-Committee was to be appointed by the Sea Fisheries Panel for the study of *Rastrelliger*, consisting of nominees of the interested Governments and it was recommended that a special meeting of that Sub-Committee be convened at a time and place to be agreed with the Executive Committee, to design an appropriate research programme for the study of *Rastrelliger* on a co-operative regional basis, to include an outline of the problems, recommend methods for the solution of those problems and the requirements for implementing such a programme.

Panel " C "—General Biology, Hydrology a Miscellaneous Fisheries

The Council reviewed pertinent sections of t report of Technical Committee I and that of t Executive Committee in the light of resoluti C52/24.1, Contributed Publications Nos. 2 & Mr. P. Ch. Veen's Preliminary Charts of Salin of the Indonesian Archipelago and the Program of Hydrographical Work for 1954 of I.C.E.S.

In view of the paucity of temperature and salin data for the region, the Council recommended t Member Governments be urged to publish te perature and salinity data available with them a to apprise the Council of the existence of such pu lications.

The report of the Executive Committee relati to the transmission to UNESCO of the Counci Resolution C52/23 regarding a possible int national oceanographic unit, and the attendance the Executive Committee at the resulting Meeti of Consultants at Manila in November, 1953, un UNESCO sponsorship, were considered by t Council.

The Council limited itself to noting the rep of the Executive Committee on these discussio and no further action was requested at this tim The Delegates for the U.S., Australia and the U. stated that the attitude of their Governments expressed at the 4th Meeting of the Council mained unchanged. The Delegate for the U. added that his Government feels that, in the pres circumstances, and particularly in view of the sho age of suitable oceanographers and the vital impo ance of strengthening technical staff, the Cou would be well advised to seek no more than appointment of one qualified oceanographer tached to the Secretariat of IPFC, assisted b small clerical staff.

The Delegate for Australia stated that his Gove ment would have no objection to the proposal s gested by the U.K. Delegate, although it wo agree to the training of oceanographers by UNESC provided that it involved no additional finan commitment.

The Council then studied those sections Technical Committee I Report and the Execut Committee Report dealing with *Plankton.* Council recorded a formal expression of thanks the UNESCO for its joint sponsorship with IPFC of the plankton Symposium conducted connection with the 5th Meeting. The succes the Symposium was largely due to the UNES assistance which made it possible for the dis guished plankton experts, Professor A. Thienema

Dr. C. J. Fish and others, to participate (See Resolution No. 8, p. 18).

The Council examined the reports of the Rapporteurs, Dr. K. F. Vaas and Mr. R. S. Esguerra, resulting from Resolution C52/24.2. Because of the poor response from members of the Plankton Sub-Committee and other plankton workers, the Rapporteurs were not able to prepare detailed recommendations on standardization for consideration at the 5th Meeting. The Council took advantage of the presence of the plankton experts Professor A. Thienemann and Dr. C. J. Fish and invited them to present their views on standardization of plankton gear and methods. These are recorded in Appendix I.

The papers presented and the conclusions reached at this joint Symposium will be published separately.

In the field of *Taxonomy*, the Council reiterated the need for simple field keys for the identification of organisms by non-specialist workers, and suggested that wherever possible, such keys should be accompanied by simple illustrations. The Council therefore directed the Executive Committee to communicate with UNESCO Regional Office to ascertain the possibility of publication of such illustrated keys [See Resolutions C51/20.3(8) and C52/24.3(10)].

The work of Technical Committee I in relation to *Mollusca* and *Crustacea* as laid down in Resolution C52/24.3(1) and the UNESCO charts published on the Council's recommendation were considered. These UNESCO charts were believed to be of value to those initiating studies in the groups concerned.

The Council directed (1) that the Keys in Technical Papers Nos. 14 and 16 be mimeographed for distribution to field workers on the particular group in the region with a view to testing out their application, soliciting comments and suggesting any necessary revision, (2) that the preparation of field keys for these and other invertebrate groups be encouraged, (3) that the subject of the Symposium at the next Meeting should be the Prawn (shrimp) Fisheries and that the Miscellaneous Fisheries Panel continue to work on these problems during the ensuing period.

The Technical Committee I Report on Seaweed was considered and Contributed Publication No. 4 was reviewed. The Council agreed to draw this Contributed Publication and the papers of the "First International Seaweed Symposium" to the attention of Member Governments.

14. Matters Relating to Technical Committee II (Technology)

The Council directed :

(a) That Technical Committee II through its Panel on Craft and Gear take whatever action is practicable to assemble information concerning the relative merits of inboard and outboard engines as used in fishing vessels and report to the Council on this subject for consideration at the 6th Meeting.

(b) That this Committee through its Panel on Socio-Economics should give consideration to the question of the significance of fish-culture as an integral part of rural economy and having reviewed the available information on this subject, report to the Council at the 6th Meeting.

Panel "A"—Craft and Gear

The Council felt that gear classification had been brought to a point where further work would not be fruitful. The work to date should be made available to the editor of the handbook on gear technology.

Papers Nos. 19 and 27 presented at the FAO International Fishing Boat Congress were considered to be of great interest and it was believed that No. 19 should be made available for wide distribution in the region. No. 27 presents valuable material for improving beach-landing operations but it was suggested that local types of vessels be developed further for this purpose.

The report of Technical Committee II discussing non-indigenous gear was examined and it was stressed that the introduction of non-indigenous fishing methods must be carefully evaluated in the light of local economic, technical and fishing conditions.

The report of Technical Committee II on the implementation of Resolution C52/25.1(4) was examined. Experimentation under fishing conditions in order to arrive at a comparative critical review of the effectiveness of the various methods described and possible improvement should be undertaken.

It was decided that the work of the craft and gear panel over the next few years should be on the following phases :—

1. Introduction and appraisal of mechanized fishing methods for small, indigenous type of fishing craft.

2. Introduction and appraisal of non-indigenous types of fishing gear.
3. Preparation of basic plans, perhaps based on the findings of the FAO Fishing Boat Congress, of craft recommended for small boat fisheries of the region.
4. Appraisal under fishing conditions of various methods of net and rope preservation.
5. Exploratory and experimental fishing operations to find new shrimp resources.
6. Further practical investigation on the use and effect of fishing with lights.
7. Studies on the use of indigenous materials for constructing nets and gear.

It was emphasized that the proposed training centre or centres for "master fishermen" requested by the Government of India under Agenda Item 12.3 should be designed to provide a maximum of practical training under actual fishing conditions with small boats. (See Resolution No 7, p. 18.)

The Council believed that the interchange of information and equipment for use in capturing pelagic-neritic species is of great value and that this exchange might be made directly between countries, the Council being kept informed of the results and consulted as might be found necessary.

It was agreed that it would be most desirable for delegates at future Meetings to have the opportunity to observe actual fishing operations, including experimental fishing.

Panel 'B'—Food Technology

The Council placed on record its disappointment that little progress had been made in the Council's work in the field of food technology, since the last meeting.

As there were only two Member Governments represented at the Panel Sessions during the 5th Council Meeting, it was agreed that, after all Member Governments have nominated their representatives to the Panel, the Chairman of Technical Committee II should select and appoint a Chairman of Panel B from the complete list of panel members. Prince Kosol Suriyong (Thailand) was chosen as temporary Panel Chairman for the duration of the Meeting.

The Council was of the opinion that, in addition to the Handbook, the title of which should be changed to "Principles of Fish Handling and Processing of Fisheries Products", a separate Special Publication should be prepared, as a master reference book on the best methods of fish handling and processing suitable for the region. Since this reference book would have to be translated, each Member Country, into the various natio languages, to serve as a text in extension work and impart information and instruction to managers a operators in the various branches of the fishing dustry, it was agreed that this master referen book might be issued first as a series of separ booklets or pamphlets, as soon as each could prepared, each dealing with the methods employ in one of the stages of handling and processing fish. It was also suggested that the preparation these booklets describing the most suitable a effective methods should receive priority over t preparation of the Handbook mentioned abov furthermore, it was decided that the publication a "Classification of Fish Processing Method be abandoned.

It was agreed that the panel should study duri the ensuing period improved methods of produci and storing dried fish and, in particular, meth suitable for use in humid or rainy weather.

Panel 'C'—Socio-Economics, Marketing Statistics

The Report of Technical Committee II studied and the Chairman's remarks on the p response from Members were recorded with regr The fact that F.A.O. could only provide a market specialist under the technical assistance program i.e. on specific request from Member Governme was noted.

It was decided that the work assigned at the Meeting to the Sub-Committees on (a) Statis and (b) Socio-Economics, be the continuing assi ment of Panel "C" during the ensuing peri including the collection and dissemination of formation and the preparation of papers of va for the next Meeting.

The papers read at the Symposium on Market covered a wide range, including: (1) the sett up of Marketing Organizations, either Gove ment sponsored and controlled, or cooperativ or privately organized; (2) the description marketing facilities at points of landing and at po of consumption, as well as the methods of t operation and administration; (3) the organizat and operation of fishermen's marketing cooperati their successes and preliminary failures; (4) role of governments in the organization, devel ment and control of marketing schemes; (5) problems of government subsidies and loans.

Much valuable material, mainly of a descrip nature, was gathered through the Symposium pa and also contributed during the discussions, has thus become available to all Delegates

through them to Member Governments and their Fisheries Administrations. It was felt, however, that to be of full value, the symposium should not have stopped (for lack of time) at the mere presentation of descriptive papers and their discussion, but should have had an opportunity for a critical discussion of the advantages and disadvantages of various systems of marketing and the marketing principles involved. Such topics suggest themselves as: auction sales versus contract sales ; simultaneous auctioning in several ways versus consecutive auctioning ; accounting systems used in auction sales ; commission charges ; etc.

General discussions took place in the fields of Socio-economics, Marketing and Statistics.

Inter-Committee Working Group

An Inter-Committee Working Group was constituted in accordance with Section X, paragraph 3 of the Council's Rules of Procedure, consisting of Mr. F. F. Anderson (Australia), Mr. C. J. Bottemanne (Netherlands), Monsieur R. Serene (France), Dr. N. K. Panikkar (India), Mr. M. J. Lobell (U.S.—Chairman) and Mr. Tham Ah Kow (U.K.) for *fisheries development*. The terms of reference of this working group would be to draw upon material made available to the Council's two Technical Committees and provide therefrom a review of fisheries development.

15. Sixth Meeting Symposium

The Council resolved that only one Symposium be held in connection with the 6th Meeting and that the subject be on the various aspects of the shrimp fisheries, including trawling in deep and shallow waters, life history and all aspects of the utilization of the shrimp catches including their use as fresh, salted, dried, smoked and canned shrimp in domestic as well as export markets, the processing of shrimp into pastes and sauces and the utilization of by-products. It was stressed that papers on these items should not merely describe the methods used, but should include technical and economic evaluations of them. It was suggested that, wherever possible, models of gear and samples of products be exhibited by authors.

C. ELECTION OF CHAIRMAN AND VICE-CHAIRMAN

Nai Boon Indrambarya, Director-General of the Thai Department of Fisheries, and head of the Thai Delegation, who had served as Vice-Chairman during the period since the 4th Meeting, was unanimously elected as the Chairman of the Council and its Executive Committee for the ensuing period, with acclamation.

Mr. J. A. Tubb, alternate delegate for the United Kingdom and Head of the Fisheries Research Unit of the Hong Kong University, was unanimously elected Vice-Chairman.

D. OTHER BUSINESS

World Survey of Fishery Resources

A communication received from the Fisheries Division of the Organization regarding the proposal to resume work on a world survey of fishery resources was examined at length by the Council. Two specific requests for assistance were addressed to the Council, namely:—

(1) to review a digest of information on the fishery resources of the Indo-Pacific Region to be submitted by the Fisheries Division of F.A.O. to the Sixth Meeting of the Council. The Council declared its willingness to review such a digest but pointed out that its Sixth Meeting will take place in October, 1955, i.e. presumably *after* the proposed World Congress on Fishery Resources ;

(2) to state whether there is any particular aspect of methodology in the survey, appraisal and management of fishery resources in respect of which the special circumstances of the Indo-Pacific Region would make it desirable to arrange a special subject meeting in the Indo-Pacific Region, either as part of or in conjunction with a regular Council Meeting. The Council felt that it could not recommend such a preliminary subject meeting to be held in the region beyond the provision of data which already exist or are being collected nor could it contribute, for some time to come, towards the formulation of an estimate of world fishery resources, for the following reasons.

The high rate of population increase combined with an urgent and increasing demand for better living conditions by the peoples in the area, has already called for national action of the highest priority by Member Governments to increase fish production from all sources. It cannot be emphasized too often that the I.P.F.C. area covers approximately half of the human population of the world and that fish is the primary protein staple in the diet of most of them. As matters stand at present, there are directives for stringent financial economy by Governments throughout the area. Therefore additional staff cannot be recruited to undertake survey duties, existing staff cannot be diverted to perform survey functions due to the

priority demands of increasing production nor can Member Governments afford to send delegates to a special meeting.

It would only be on the occasion of the October 1955 Meeting that any concerted action could be taken. If F.A.O. at Rome is of the opinion that a useful purpose at an I.P.F.C. level can be served by reconciling action with the conditions mentioned above, the Council recommended that steps might be taken *via* the Council through its Administrative Correspondents to Member Governments in the usual way. The Council assumed that Member Governments would be addressed by Rome and that overlapping or duplication of work should be avoided.

As a corollary to the above remarks, it was pointed out that the National Fisheries Departments of the Region with the exception of Japan are young. All Member Governments are fully aware of the need for survey of fishery resources to prepare the way for future planned exploitation and have National Programmes planned or recently started. It is the sincere and earnest wish of all Members of the Council to be able to make a real and more constructive contribution to a world survey, in, say, ten years time and much of the Council's work is directed to this end.

CLOSURE OF MEETING

Votes of appreciation and of thanks were expressed to the Chairman, Monsieur R. Serene, for his successful conducting of the Meeting; to the Secretary, Dr. Cecil Miles, his assistants and staff for the efficient manner in which the Secretariat work had been carried on, especially in relation to the streamlining of the procedure in accordance with the Resolution adopted at the 4th Meeting; and to Dr. E. Hess, Chief of the F.A.O. Technology Branch for assistance and guidance on a number of subjects in his special field.

The 5th Meeting was closed by H.E. Field Marshal Phin Chunahavan, Minister of Agriculture, on Friday, February 5, 1954, at 5 p.m.

RESOLUTIONS

Resolution No. 1

In view of procedural difficulties that have arisen from time to time, militating against the efficient operation during inter-meeting periods, of the Sub-Committees appointed at Council Meetings and as frequently it has occurred that members appointed to these Sub-Committees have, for various reasons, been unable to act effectively, and further, in an effort to ensure as far as possible a degree of continuity within the membership of the sever sub-committees—

The Council Resolves

That the attention of Member Governments l invited to the new form of organization of Tec nical Committees I and II into three Panels ea as follows :—

Technical Committee I	Technical Com mittee II
Panels	Panels
A. Inland Fisheries	A. Craft and Gear
B. Sea Fisheries	B. Food Technology
C. Miscellaneous Fisheries including Hydrology, Plankton, etc.	C. Socio-Economics and Statistics

and that Member Governments be requested endorse the Council's action where members Delegations have been appointed to these Pane or, if they so desire, to nominate for co-option these Panels alternative and/or additional worke who may not have been present at the Meeting, a further that Member Governments might consid the possibility of setting up a committee of su nominees to advise and assist the Administrati Correspondent.

Resolution No. 2

In view of the fact that great changes have occu red in faunal distributions throughout the worl seas, as is evidenced especially by changes in t abundance of sardine-like fishes in many areas, i cluding the Mediterranean, the Pacific and Indi Oceans, as well as changes in the distribution of t cod-like and tuna-like fishes and others in t Atlantic and elsewhere ; and since the causal fact associated with these faunal changes are at pres unknown, and the association of these fau changes with the changes in hydrological and me orological conditions is little understood at present

The Council Resolves:

(1) That Member Governments be invited give consideration to these matters being of major significance in relation world fisheries production.

(2) That Member Governments be request to explore means by which evidence such faunal changes and phenome related thereto might be fully do mented.

(3) That the Fisheries Division of F.A.O. requested to explore the possibilit of obtaining similar information fr

Governments and Organizations outside the immediate zones of interest of the Indo-Pacific Fisheries Council.

Resolution No. 3

In view of the intensity of national programmes for the development of both primary and secondary industries, and as the unwise discharge of waste products into rivers, estuaries and bays appears frequently to have resulted in serious damage to commercial fish stocks by pollution of the water or by other deleterious changes in the aquatic environment—

The Council Resolves:

That the attention of Member Governments be drawn to the information on this subject already assembled by the Council;

That Member Governments be requested to explore ways and means for the further study of actual extent of damage which may be caused to fish populations by industrial or other pollution and suitable remedial action; and further,

That the advice of competent workers as to methods for avoiding or overcoming such damage should be given consideration when plans for urban, rural and industrial development are under review.

Further, the Council is aware that certain recommendations on this subject were made by the FAO. Regional Meeting on Land Utilization in Tropical Areas of Asia and the Far East and the Islands of the Pacific convened by the Food and Agriculture Organization of the United Nations in Ceylon, 1951, and suggests that Member Governments may consider it desirable to bring the views of the Council to the attention of National Land Utilization Committees where these exist.

Resolution No. 4

The Council feels greatly concerned about the possible adverse effects on the inland fisheries of the Indo-Pacific Area of water development projects and endorses the active policy pursued by the Executive Committee in cooperating with the Flood Control Bureau of ECAFE. of the United Nations in the matter of fisheries requirements in connection with multi-purpose river basin development. In view of the fact that insufficient information regarding the biology of riverine fisheries of the Indo-Pacific Region is available and that some of the fisheries measures such as fish ladders which are in use in Western countries have often been found to be unsuitable to the rivers of this area—

The Council Resolves

That the attention of Member Governments be drawn to the urgent need for conserving and exploiting the fishery resources associated with river basin projects by rectifying the adverse effects on the resources caused by dams and other obstructions through preventive, remedial and restoratory measures and developing fish production in the reservoirs and ancillary waters.

To achieve this the fishery requirements relating to each dam should be determined by careful survey and experimentation by senior fishery biologists and engineers, without indiscriminate adoption of conventional fish ladders and other measures, the suitability of which to Asiatic conditions is questionable, and the findings arising from the investigations should be implemented.

Resolution No. 5

The Council recognizes the merits of the FAO. Conference Resolution quoted in the Report of the Executive Committee, especially the endorsement of projects likely to effect quick results, including promotion of fish culture and improvement of craft and gear. With a view to the implementation of the Resolution of the Conference—

The Council Resolves

That the Director-General and the Fisheries Division of FAO. be requested to consider, within the approved budget, the possible redistribution of funds and personnel to strengthen the technical staff of the FAO. Regional Office for Asia and the Far East by assigning specialists on gear and craft, food technology and fish culture to provide advice and assistance toward the immediate and practical application of improved methods.

Resolution No. 6

In view of the widespread distribution and commercial importance of fishes of the genus *Rastrelliger* in the Indo-Pacific Area and as the fisheries departments of certain Governments have already initiated investigations designed to develop the fisheries of this genus as well as to gather information upon which programmes for the efficient management of these resources may be drawn up, it is considered desirable that attention be given to the possibilities of establishing collaborated research projects on *Rastrelliger*, to foster the interchange of data and scientific material between workers in the area, including those countries in which it has not yet been possible to initiate specific projects concerned with these fishes. Also, it is considered

desirable that further intensive studies on these fishes should be undertaken—

Therefore, the Council Resolves

That Member Governments be invited to give their urgent consideration to this problem and at the earliest possible opportunity to nominate experienced workers to form an *ad hoc* committee of the Sea Fisheries Panel in Technical Committee I.

That this committee meet, at a time and place to be arranged, to design an appropriate research programme for the study of fishes of the genus *Rastrelliger*.

That this programme include an outline of the problems, recommended methods for solving these, and definition of the requirements for implementation.

That the *ad hoc* Committee present its recommendation through Technical Committee I, to the Executive Committee of the Council, which would then circularize the Member Governments concerned to seek endorsement of these recommendations and to ascertain how far such a programme might be implemented within the framework of existing national programmes and to what extent and in what form external assistance might be sought.

Resolution No. 7

As mechanized gear is being introduced into many countries of the Indo-Pacific area and the absence of suitably trained personnel for operating this gear is proving a serious handicap to fishery projects requiring the use of powered vessels, the Council is of the opinion that there is an urgent need for the provision of suitable facilities within the area to provide the necessary trained personnel—

Therefore the Council Resolves

That the Food and Agriculture Organization be requested to take urgent steps for the establishment within the Indo-Pacific area of centre (s) for training in mechanized fishing on a sub-regional basis, when possible taking advantage of the facilities existing in certain countries and when necessary seeking close cooperation with other international or intergovernmental agencies.

Resolution No. 8

The Council notes the success of the Sympo on Plankton and the application of the sub discussed to the development of fisheries—

The Council therefore Resolves

That an expression of grateful appreciatio the assistance given by U.N.E.S.C.O. in organ the Symposium on Plankton and facilitating attendance of eminent specialists be place permanent record, and that it be communi to the Director-General of U.N.E.S.C.O.

Resolution No. 9

The Council Resolves

That this Council place on permanent reco expression of sincere appreciation to the Go ment of Thailand for the kind hospitality and cellent facilities that have been extended to Council and to the delegations of Member Go ments during the Fifth Meeting, and that thi pression of appreciation be communicated to Excellency the President of the Council of M ters by the Executive Committee of this Coun

Resolution No. 10

The Council Resolves

That the Council express its deepest thank his Excellency Field Marshal Pibul Songg President of the Council of Ministers of Thai for the welcome extended by him to the dele of the Member Governments attending the Meeting of the Council.

Resolution No. 11

The Council Resolves

That this Council extend its grateful than the Honourable Minister of Agriculture and thr him to the Director-General and staff of the Fish Department of Thailand for the unremitting and foresight exercised in meeting the needs Council and of the delegations from the Me Countries.

The Delegations were entained at the following field excursions and receptions :—

A reception by the Minister of Agriculture on the evening of January 22.

A visit to the Bangkok Fish Market with buffet breakfast by courtesy of the Thai Department of Fisheries on January 23.

Sightseeing in Bangkok by courtesy of the Royal Household and the Ministry of Agriculture on January 23.

Tour of Bangkhen Agricultural and Fish Culture Station and lunch at the Kasetsatra University, on January 24.

Classical Thai Theatre, by courtesy of the Under Secretary of Agriculture, evening of January 25.

A Reception in honour of the Delegates by the Regional Representative of the Director-General of F.A.O., evening of January 26.

Inspection of marine fisheries fish and sauce factory at Ta-chin, with Buffet Dinner, by courtesy of the Fishermen's Society, on January 30.

Excursion to Ayuthia ruins, return by launch on the Chao Phya River, by courtesy of the Thai delegation, on January 31.

Buffet Dinner by the President of the Council of Ministers at Government House, evening of February 3.

Reception by the Director-General of Fisheries, evening of February 5.

Two film evenings were organized on January 27 and 29, at which were shown the Indian film, " Wealth of our Waters " and two underwater British films, " The Trawl in Action " and " The Danish Seine ", provided by courtesy of the Thai Government and the Foreign Operations Administration (F.O.A.) of the United States. A lecture on " Sound Production by Marine Fishes " was given by Mrs. M. P. Fish on January 27 with lantern slides, colour film and tape recording of fish sounds.

APPENDIX I

ON THE STANDARDIZATION OF PLANKTON GEAR AND METHODS

by

Professor A. Thienemann

Hydrobiologishe Anstalt, Ploen, Holstein, Germany

and

Dr. C. J. Fish

Narragansett Marine Laboratory, University of Rhode Island, Kingston, Rhode Island, U.S.A.

1. The minimum frequency of *plankton sampling in freshwaters* should be not less than once a month in natural bodies of water and once a day, or 3 times a day if possible, in cultivated ponds.
2. As complete a study as possible should be made of the environment. The observations and procedures listed on page 69 of the Proceedings, I.P.F.C., 4th Meeting, Section B.2 were approved as a minimum programme. In addition it is desirable that the study should include an analysis of bottom deposits and of the soil surrounding the body of water under investigation.

Two methods of sampling were advocated for freshwater plankton studies.

1. Filtration of 18 litres of water through an ordinary plankton net with a mesh aperture size of 25 u.
2. Sedimentation of organisms in 50 cc of water by the addition of Potassium Iodide (until a faint yellow color is apparent). The organisms may then be counted and studied by means of a reverse-field microscope.

The suggestions for continued work on the biology of *marine plankton*, contained in the Report of Technical Committee I to the 5th Meeting, appeared to summarize very well desirable zooplankton studies of importance to the commercial fisheries.

Several of the suggestions, such as items (b), (c) and (g) in paragraph 6.23 of the above report, do not of course lend themselves to standardization as they must necessarily be largely of a qualitative nature and carried out with methods adapted to the particular conditions obtaining in the area or areas under investigation. However, item (a) on the relative productivity of different ocean areas involves quantitative and qualitative analyses of the annual biological cycle of the zooplankton w will provide a basis for determination of augr tation and depletion rates, and frequency of rep ment (number of generations) of component spe This information is essential in the study of plankton productivity, and as the organisms prising the marine population are relatively w spread they should be a favourable subject for related studies by Member Nations utilizing st ardized methods. It is for investigations of type that international standardization of field laboratory methods is recommended.

Field Methods—Suggestions for standar tion of zooplankton field methods must necess be based on the following considerations :—

(a) Not all plankton can be sampled in operation with any single type o paratus so far devised. One must t fore decide on the size range of plankton organisms to be collected select appropriate collecting gear.

(b) For a representative sample the haul be of sufficient duration to over inequalities in horizontal and ve distribution.

(c) Standardization will in most instanc practical only for quantitative stud

In planning for field work, zooplankton c considered in four categories, each of which re special adjustment in type and mesh of colle gear :—

(a) Macrozooplankton (+5mn)—typic oceanic and outer neritic zones.

(b) Zooplankton (−5mn)—inland w (bays, lagoons, along shore).

(c) Juveniles and Microzooplankton— lopmental stages of entomostrac microcopepods.

(d) Special Ecological Groups— pelagic fauna adjacent to the bott

Quantitative Sampling—The mesh sizes listed below refer to silk bolting cloth, numbers 0, 2 and 12. This may be replaced by any readily accessible material of comparable mesh, such as grit gauze.

I. **Macrozooplankton** (oceanic and neritic)

(a) Standard metre net of Michael Sars of POFI type (both of approximately the same dimensions) of No. 0 and No. 2 meshes or their equivalents. Minimum requirements might be met with an oblique haul of uniform speed and duration through the epiplankton zone (upper 200 metres on the open ocean; bottom to surface in areas of less than 200 metres depth).

(b) For shallow coastal waters the Albatross-type half metre net may be utilised. This is of the same general shape and mesh combination as the Michael Sars metre net, but with a mouth diameter of 19.5 inches and length of 7¼ feet.

(b) Same as (a), but with a flow-meter of Atlas or comparable type in the mouth opening.

(c) Gulf III half metre metal sampler with mouth and cod end flow-meters for towing up to 6 knots. This is the most effective and accurate quantitative zooplankton sampler yet devised for open oblique and surface hauls but it is cumbersome and cannot be operated from very small vessels lacking a winch and boom.

(d) Clarke-Bumpus Sampler of No. 2 mesh for open oblique hauls where plankton is abundant and small. Not satisfactory when plankton is sparse.

Of the four offshore methods, (c) and (d) would appear too expensive for general adoption; (b) is recommended as a practical, relatively inexpensive method.

II. **Zooplankton** (Inland waters)

(a) Standard half metre No. 2 mesh net of Albatross type or foot net of similar mesh where water is shallow. Oblique hauls of uniform speed and duration from the bottom to the surface.

(b) Same as (a) but with a flow-meter in the mouth opening of the half metre No. 2 mesh net.

(c) Clarke-Bumpus Sampler with No. 2 mesh, oblique or surface hauls in shallow water.

As most of the marine plankton studies in the Indo-Pacific Region are in inland waters the standard half metre net equipped with a simple flow-meter (IIb) is recommended for standardization as the zooplankton sampler for general quantitative work.

III. **Microzooplankton and Juveniles**

(a) Clarke-Bumpus open sampler with No. 12 mesh. Oblique hauls from 50 metres to the surface for juvenile stages of plankton organisms, or 100 metres to the surface when microplankton species such as OITHONA and MICROSTELLA are present.

(b) The pump method is also suitable for sampling juvenile zooplankton, particularly nauplius stages which are usually centered in the upper 50 metres. When operating from a vessel the end of the hose is attached to the sounding weight and lowered to the proper depth recorded by the meter wheel. The desired volume, commonly 350 litres, can be pumped into a graduated cylinder and filtered through a small net attached to a bottom spigot, or pumped directly into the net if a water meter is attached to the pump. The hose can be gradually raised to form a vertical haul or taken in a series of separate hauls from different levels.

IV. **Special Studies**

These are generally only roughly quantitative and include:

(a) Heligoland trawls for sampling the semi-pelagic fauna, comprising amphipods, mysids, cumacids, ostracods etc., adjacent to the bottom during daylight hours. Towing trawl a measured distance will permit calculating the area of the bottom sampled.

(b) High speed samplers—not recommended for consideration in their present stage of development.

Laboratory Procedure

The standard laboratory displacement method of quantitative measurement of zooplankton is recommended, with the modification described by King (p. 43 (1)) in samples containing both large and small specimens.

For a quantitative analysis of species composition, a stempel pipette is generally used, and a fraction

(2 cc) of the measured sample removed. This is placed in a petri dish on a counting plate, and the number per cubic metre of each species computed. It is then customary to inspect the balance of the sample and to make the list of species complete by adding as traces (T) forms not taken in the pipette.

To Summarize. The following relatively inexpensive sampling methods, now widely used, would appear most practical for standardization in inland water research :

(a) **Zooplankton**—standard half metre net of No. 2 or equivalent mesh, with a flow-meter in the mouth opening.

(b) **Phytoplankton and Nannoplankton**—Water sample taken with a Nansen bottle (for vertical series) or any convenient sampler for surface collection.

For ocean and open coastal neritic waters the metre-net of Nos. 0 and 2 or equivalent meshes, and with a flow-meter in the mouth opening as recommended for standardization. Phytoplankton and nannoplankton collecting methods would be the same as in inland waters.

After discussion and consideration of the statement of these plankton specialists, the Council believed :

1. That at present there are apparently no instruments or methods generally recognized as standard in plankton research.
2. Objectives for carrying out plankton studies vary in different countries and the methods and gear employed must usually be modified to conform with the particular objectives in view and the facilities available to the investigator.
3. While the Council does not, at the pre juncture, propose that the proced suggested by Prof. Thienemann Dr. Fish be adopted as standard, i recommended that these methods proved utility be used whenever poss by plankton investigators in the Reg
4. That quantitative methods be emplo whenever possible and that repli hauls or samples be taken to provide evaluation of the sampling variabi
5. In view of the desirability that plank data be comparable between differ bodies of water and between regions i strongly urged that in reporting res of plankton studies (a) the plank collecting devices be fully descrit including especially the dimension the gear and the size of mesh apertu (b) the method of hauling and stratum of water sampled be gi (c) the method of measurement or e mation of the amount of water strai be fully described, as well as (d) method of processing the sample in laboratory.

If investigators will follow these suggestions believed that plankton data will have more comp tive value regardless of the manner or means which they are obtained. It has not been fo possible to set up standards at this meeting we doubt the wisdom of doing so. New and proved plankton collecting devices are curre being devised and in all probability any prese adopted standards would soon become obsolet

APPENDIX II

COUNCIL'S STUDY OF THE SUBMISSION OF THAI FISHERIES PROBLEMS BY THE THAI DELEGATION

In accordance with the suggestion contained in the Study of Council Procedure at the 4th Meeting, to the effect that the Council should give attention to the research, technical and developmental needs of the host country, the Thai Delegation submitted at the 5th Meeting a list of eight points, upon which the Council comments as follows :—

The Council is glad to have a statement of the principal fields of fisheries development in Thailand which has been submitted by the Thai Delegation, together with the various papers on the fisheries of Thailand distributed as Contributed Publications. The Members of the Council have also had the opportunity to visit the Fisheries Experimental Station in Bangkhen and other cen of fishery activity. The points raised by the T Delegation are extremely important for the fishe development not only of Thailand but of the var countries of South and East Asia, but it is not to provide a full answer to the general questi Some of the aspects within the general points ra in the submission of the Thai Delegation are d with in the following notes.

(1) *Improvement of fish culture techniques*

The Council has noted with great pleasure much advancement in fish culture techniques already taken place in Thailand. A notable

ribution in this field is the introduction of Tilapia rom Malaya which is well suited to the condi-ions in Thailand. This fish seems to have given very successful results in various parts of the coun-ry. The Council feels that the pattern of fisheries in inland waters may slowly vary as Tilapia becomes established and therefore the subject of its relation-ship to other cultured fish in establishing a biologi-cal balance should be closely studied. It is hoped that research work along these lines will be taken up in Thailand. There is room for improving fish cultural practices by such studies.

The Council also noted with pleasure the dis-covery of Chanos fry in Thailand by the Fisheries Department and this has opened up a possibility of a new industry similar to the Chanos industry of Indonesia and Philippines. The Department be-lieves that this industry could possibly be develop-ed. It will, however, be essential to carry out con-siderable extension work to encourage people to take up Chanos Fish Culture. The Fisheries Department may construct some brackish-water ponds, on a pilot scale, to investigate the possi-bility of promoting a successful Chanos cultivation industry.

The officers of Thailand might find the 4th Meet-ing's recommendations of the Council on fish culture techniques valuable for this purpose and the Council also suggests that the Fisheries Depart-ment of Thailand might take advantage of the proximity of the library and other facilities of the I.P.F.C. Secretariat.

(2) *Stocking of fish in inland waters including rice fields*

The Council has learned from Contributed Publications that Tilapia has been successful for growing in rice fields in Taiwan (Formosa). The results seem to suggest that Tilapia will be useful for growing in the rice fields in areas where the fields have sufficient water. This could perhaps be tried in Thailand where conditions might be suitable.

(3) *Possible effects of hydro-electric projects on the fisheries*

The discussions during the Council and the Committee Sessions have indicated the need for detailed fisheries surveys of areas before hydro-electric projects are taken in hand. It is assumed that the Government of Thailand will be conducting such fishery surveys through the Fisheries Depart-ment or through specialists attached to the Fisheries Department. The Council feels that such surveys are essential owing to the im-portance of fisheries in the economy of Thailand and that hydro-electric projects should not prove inimical to fisheries. The engineers drawing up the projects should especially understand the re-quirements of fisheries when these are plan-ned and that close liaison should be maintained between the Department dealing with river develop-ment and the Department of Fisheries.

The above-mentioned programmes will be pos-sible only if the Director-General of Fisheries has on his staff experienced and trained research workers. The Council is convinced that (a) equipment (b) personnel and (c) funds for carrying out re-search on a scale sufficiently advanced as to be effective are essential. From the scientific points of view, answers to the submission of the Thai Delegation will come if the best scientific talent in the Country is selected and encouraged in re-search studies on fisheries, both by giving openings in Thailand and by the awards of fellowships for training in other countries. The Government should do everything possible to establish a strong programme of scientific research under the Director-General of Fisheries and provide funds for this purpose.

(4) *Improvement of fishing gear and methods, including simple mechanization of local craft*

Some of the fishing gear introduced in Thailand waters have worked satisfactorily especially the Otoshi-Ami and the fish trap which can with ad-vantage be taken up by other countries. It is hoped that more facilities may be provided to the Thai Department of Fisheries for improving the methods of capture. Special attention should be paid to mechanizing the boats of the fishermen and equip-ping them with improved gear. In achieving this, a school for training fishermen will be necessary.

(5) *Production of fish meal and other by-products*

The programme of the Thai Government of developing small fish-meal plants suitable for in-stallation in isolated fishing villages is commended and it is suggested that other member countries may profit from similar projects. Other by-products which require attention are liver oil, fish sauces and fish pastes.

(6) & (7) *Improvement of living standards of Fishermen; Cooperative and Marketing Systems*

Without improving the living standards of fisher-men, it is impossible to develop the fisheries of a country. They are often heavily indebted ; ways and means should be found to help the fishermen

to independence. The Government might have a revolving fund for extending loans to the fishermen, preferably through their Cooperative Societies. It is also suggested that the material required by the fishermen may be procured at subsidized rates and that the import duty on this material be abolished or considerably reduced.

The Council was pleased to see the working of the fish market and to be acquainted with the future plans. This programme warranted the continued active support of the Government.

(8) *The training of technicians*

There is a great dearth of technicians in the of fisheries throughout the region and it is esse that special attention should be paid by the Gov ment towards this aspect. It may, howeve pointed out here that officers, after training, often expected to revolutionize the fisheries ; development of fisheries in this region is and be a slow process as the governing factors are that revolutionary or abrupt progress can ne be expected nor are they desirable.

REPORT OF THE EXECUTIVE COMMITTEE TO THE FIFTH MEETING

I. MEMBERSHIP OF THE COUNCIL

The following sixteen Governments, all Members of FAO, at present constitute the Council :

Australia
*Burma
Cambodia
Ceylon
*France
*India
Indonesia
*Japan
Korea
*Netherlands
Pakistan
*Philippines
Thailand
*United Kingdom
*United States of America
Vietnam

The Government of the Kingdom of Laos and of Portugal have announced the intention to send Observers to the Council's 5th Meeting, under Section XI(2) of the Council's Rules. A similar invitation has been sent to the Government of Nepal. There are at present no Members of the Council which are not Members of FAO.

II. EXECUTIVE COMMITTEE MEETINGS

The Executive Committee, consisting of the Chairman, Vice-chairman and Retired Chairman, has convened on four occasions since the 4th Council Meeting, at the following times and places :

(1) At the residence of the Director of Fisheries, Manila (November 7, 1952).
(2) Conference Room, Gajoen Hotel, Tokyo (April 9-15, 1953).
(3) Office of the Director, Bureau of Fisheries, Manila (November 8, 9, 1953).
(4) Santhidam Building, Bangkok (January 20-21, 1954).

III. TRAVEL

The travel of regional officers serving the Fisheries Councils of FAO was somewhat curtailed during the year owing to budget restrictions. The I.P.F.C. travel item for Executive Committee Meetings was not, however, reduced.

Apart from travel to the above Committee Meetings, the Chairman, accompanied by the Secretary, attended the Pre-Conference Meeting of the Organization held at Bangalore (India) from July 27-August 5, passing through Calcutta and Madras. Opportunity was afforded by the Executive Committee Meeting held in Japan to inspect Japanese fisheries activities throughout the main island, by courtesy of the Government of that country. The Secretary also paid visits to Cambodia, Laos and Vietnam, to the Portugese colony of Macau and on two occasions to Hong Kong, besides a tour of the interior of Thailand in the company of the Director-General of Fisheries and his officers. The Council was represented by Dr. G. L. Kesteven, FAO Fisheries Division, at the 41st Meeting of the International Council for the Exploration of the Sea at Copenhagen from September 28-October 5, and by the Secretary and Chairman at the joint UNESCO/FAO Meeting of Experts on Oceanography, and at the 8th Pacific Science Congress at Manila from November 12-28. Arrangements were made through the Secretariat for Dr S. W. Ling, ETAP specialist assigned to the Government of Thailand, to travel to Cambodia and Vietnam in October, 1953 in connection with the fish culture programmes of those countries.

IV. STATEMENT ON BUDGET AND FINANCE

Budget

It is provided in Article VI, paragraph 2 of the I.P.F.C. Agreement that certain expenses of the Council shall be determined and paid for by the Food and Agriculture Organization of the United Nations within the limits of an annual budget prepared and approved in accordance with the current regulations of the Organization.

The Organization has, in fact, continued to maintain the small budget allocated to the Council without any significant reduction, in spite of the critical financial situation with which, it is understood, the Organization is confronted as a result of its expanding commitments vis-a-vis its Member Governments.

*Original signatories of the 1948 Agreement formulated at Baguio, Republic of the Philippines.

Below is given a comparison of the Council's Budget provided by the FAO for different years :—

	1951 US$	1952 US$	1953 US$	1954 US$
Travel	2,000	2,500	2,000	2,000
Meeting	750	750	—(1)	750
Printing	2,023	2,000	2,500	2,500
Miscellaneous	500	1,250	1,000	1,000
Total ..	5,273	6,500	5,500	6,250

(1) No Meeting in 1953.

Other expenses, including the salaries of the professional staff of the Secretariat, continue to be paid from the budget of the Fisheries Division of FAO through its Regional Office for Asia and the Far East, located at Bangkok, which also provides certain clerical assistance.

The budget allocations for 1952 and 1953 were revised subsequent to the statement contained in Part I of the 4th Meeting Report, additional funds having been requested and made available towards the end of 1952. The Meeting item of the 1953 budget was redistributed, there having been no Council Session in that year.

The Council has during 1953 been represented at Meetings in various countries either by the Secretariat staff or by members of the Executive Committee. This, however, involved no expenditure against the travel item of the Council's budget.

The existing budget item for Miscellaneous E penditure does not cover expenditure in connecti with translation services (French/English) for purpose of the Council's publications and pap and a small amount of correspondence through year with the French speaking countries, althou several requests that such material should communicated in French have been received the Secretariat.

Expenditure

The following is a statement of expenditure the financial years 1952 and 1953 grouped acco ing to the different sub-headings of the budget. is pointed out that these figures are subject to c firmation or re-allocation by the Budget and Fina Section of the Administrative Division, FA Rome, and that the major part of the 1953 comm ments will be paid late in 1953 or early in 1954.

Statement of Account for 1952

		Expenditure US$	Budget Allocation US$	Revised Budget Alloca-
A. **Executive Committee Travel :**	..	2,203.76	2,000.00	2,500.
I.P.F.C. 3rd (1951/52) Executive Committee Meeting, Nha Trang, Viet Nam, February, 1952. Expenses of Chairman and Member	1,068.21			
I.P.F.C. 4th (1951/52) Executive Committee Meeting, Bangkok, Thailand, July, 1952. Expenses of Chairman, Vice-chairman and Member	1,073.05			
I.P.F.C. 5th (1951/52) Executive Committee Meeting, Quezon City, Philippines, October, 1952. Expenses of Member ..	62.50			
B. **Printing :**		1,508.48	2,000.00	2,000.
Current Affairs Bulletin Nos. 5-9	89.54			
Library cards	25.35			
Letter Head	10.23			
4th I.P.F.C. Proceedings, Section I, (Manila) including distribution and postage	859.00			
4th I.P.F.C. Proceedings (Madras) Section II ..	524.36(i)			
C. **Meeting :**		704.98	750.00	750.
Expenditure for 4th I.P.F.C. Meeting, Quezon City, Philippines, Oct./Nov., 1952, to cover cost of air freight, shipping charges, interpretation services and other incidental secretarial expenses ..	704.98			
D. **Miscellaneous Expenses :**	..	1,223,56	1,000.00	1,250.
Office equipment	322.17			
Shipping and freight	13.31			
Stationery and supplies	196.44			
Telegrams and postage	635.22			
Bibliographic services	16.78			
Mailing expenses incurred by FAO Information Office, New Delhi ..	39.64			

(i) Part payment made in March, 1953 but chargeable to the 1952 budget.

Statement of Account for 1953

		Expenditure US$	Budget Allocation US$	Revised Budget Allocation US$
Executive Committee Travel :		2,176.10	2,000.00	2,000.00
I.P.F.C. (1952/54) Executive Committee Meeting, Manila, Philippines, November, 1952. Expenses of Chairman and Vice-chairman (no expenses)	———			
I.P.F.C. 2nd (1952/54) Executive Committee Meeting, Tokyo, Japan April, 1953, Expenses of Chairman, Vice-chairman and Member	1,756.80			
I.P.F.C. 3rd (1952/54) Executive Committee Meeting, Manila, Philippines, November, 1953. Expenses of Chairman and Vice-chairman.	419.30			
Printing :		1,389.20	2,500.00	2,500.00
Printing letterhead, envelopes, and seals	179.30			
Drawing charges	2.91			
Current Affairs Bulletin Nos. 10 and 11	39.85			
Despatch of 3rd I.P.F.C. Proceedings (Madras)	25.64			
Commitments (see below)	1,141.50			
Meeting :	..	..	..	..
(No meeting in 1953 and therefore no budgetary allocation for this item)				
Miscellaneous :		1,025.56	1,000.00	1,000.00
Postage and Telegrams	576.47			
Stationery & Supplies	402.54			
Mailing expenses incurred by the FAO Information Office, New Delhi, Jan. 1952 to May, 1953	46.55			

otes : *Printing :* Commitments have been requested in respect of the following :—

(a) Balance of printing charges in connection with Section II of the 4th I.P.F.C. Proceedings	540.00
(b) Balance of printing charges for the revised " List of Scientific and Other Periodicals published in the Indo-Pacific Area "	240.00
(c) Printing of Agreement and Rules (revised)	90.00
(d) Printing of Abstracts for the 5th I P.F.C. Meeting	160.00
(e) Printing covers and binding of papers for the 5th I.P.F.C. Meeting	90.00
(f) Printing CAB. No. 12	20.00
(g) Office supplies	1.50
	1,141.50

It was possible to charge the majority of the printg charges in respect of the Proceedings of the 4th eeting to the 1952 budget, thus relieving the 1953 idget of an amount of $524.36. Had this amount en paid in 1953, the printing charges would have iounted to $1,913.56. There was thus a balance ailable of $1,110.80 which, it had been hoped, would be utilized for the printing of at least one of the projected Handbooks. No manuscript having become available, this balance was unspent.

Miscellaneous. It is to be noted that there may be further small charges incurred by the FAO Information Office, New Delhi, for the period June-December, 1953.

V. IMPLEMENTATION OF COUNCIL DIRECTIVES AT 4TH MEETING

The Committee presents the printed Proceedings of the 4th Meeting. Apart from the activities outlined in subsequent sections of this report, the following steps were taken to implement the Council's directives given at the last Meeting.

A. Technical Committee I

C52/24.1

In the field of *Hydrology*, communications were addressed to the Indonesian Government and to Mr. P. Ch. Veen soliciting the latter's assistance in making a survey of the existing oceanographic stations having water sampling facilities in the Central Sector, and in collecting temperature and salinity data from shipping lines for incorporation in standard monthly charts. No reply has been received to date. The intention of Member Governments and of the Council's Hydrology Sub-Committee was drawn to the desirability of conducting estuarine and neritic hydrological investigations and to the Council's wish for papers at the 5th Meeting giving details of these programmes. Charts of the General Current Circulation, Isotherms of Air and Sea Surface Temperature, Air Circulation, Isobars and Gale Frequency, published by the Royal Netherlands Meteorological Institute, in respect of the Indian Ocean, the China and Australian Seas, and the World Atlas of Sea Surface Temperature issued by the Hydrographic Office of the United States Navy, are now available in the Secretariat. The Executive Committee suggests that these documents, compiled from information gathered over a number of decades, be consulted by the Hydrology Committee during the 5th Meeting, with a view to ascertaining in which ways the information contained therein might be utilized and expanded by the Council.

C52/24.2

In the field of *Plankton* studies, the rapporteurs for freshwater and marine plankton were reminded of their undertaking to continue correspondence with specialists of the region in an effort to present at the 5th Meeting a report on standardization of methods and planktonology programmes suitable for the region and their reports will be submitted through Technical Committee I. Few plankton workers were present at the 4th Meeting, and this was therefore chosen as the subject of the Symposium at the present Sessions. Your Committee is happy to report that successful arrangements have been concluded with the United Nations Educational Scientific and Cultural Organization (UNESCO) for the holding of a jointly sponsored Symposium and UNESCO has been principally responsible for the presence of the large number of plankton workers at this Meeting, both from the Region and from other countries. A satisfactory number of papers on the subject has been contributed by Member Governments and by individual workers invited to attend the Symposium. Publication tables of Zooplankton Organisms published by ICES between 1949 and 1952 are available for consultation in the Secretariat.

C52/24.3(1)

The *General Biology* Committee was directed to deal with the prawn fisheries during the present period and the results are contained in the report of Committee I. A number of technical papers has been submitted by Member Governments on the subject at this Meeting. It now becomes necessary to decide which activities of those set forth in Resolution 52/24.3(1) should be embarked on during the ensuing period. Two taxonomic charts, prepared by Dr. M. W. F. Tweedie, Director of Raffles Museum, Singapore, were printed by UNESCO at the instance of the Council and are available at this Meeting as contributed publications Nos. 10-11.

C52/24.3(3)
24.3(4)
24.3(5)

Information was requested of Governments in respect of *Tuna* in accordance with the terms of Resolutions 24.3(3) & (4) and the members of the corresponding committee were circulated. A satisfactory number of replies was received and passed on to the Tuna Committee, while in some cases it has been stated that no information is available. The analysis of these data corresponds to the Rapporteur of the subject committee and will be presented, through Committee I, at this Meeting.

C52/24.3(6)

In the field of *Seaweed*, Dr. J. S. Zaneveld, who is now in Holland, has accepted the Council's assignment to undertake the revision of his two papers on the Economic Marine Algae of Malaya in consolidated form applicable to the Region as a whole, and Member Governments have been requested to co-operate in the form suggested in Resolution C52/24.3(6). Material has been received from Burma, Cambodia, India, U.K. and U.S. and has been passed on to Dr. Zaneveld in connection with his assignment, and to the Seaweeds Committee.

C52/24.3(7)

Member Governments were requested to supply information on methods of seaweeds resources survey and replies have been received from seven Member Governments, together with documentation from the Institute of Seaweed Research, Inveresk, Scotland. This material has been utilized by the Sub-Committee in its report and attention is called to the requirement of Resolution 24.3(7) passed at the 4th Meeting that " if the further development of such survey techniques seem necessary the Sub-Committee for Seaweeds be authorized to examine the means whereby experimental work for this purpose be undertaken ". The Seaweeds Sub-Committee, in its report to this Meeting, recommends that all Member Governments of the Council carry out studies based on the methods used by the Scottish Institute.

Attention is called to comments received from the U. S. Government to the effect that " the marine vegetation of the tropics is still ecologically and biologically too poorly known to make deductions as to plant associations and volume of occurrence from data collected in temperate zones " and that " a more detailed reply to (the Council's) query would require several months of intensive study of all published and much unpublished material ". The Executive Committee believes that the Council and similar institutions engaged in the encouragement of research in tropical waters in the Far East should seek to ascertain whether such exploitable resources exist in the tropics. This work would engage the full-time attention of specialists.

C52/24.3(8/9)

In the field of *Pelagic-Neritic Fisheries*, the Council deemed it advisable that a survey be made of the biology of the stocks on which these fisheries operate. The questionnaires prepared at the 4th Meeting were circulated to Member Governments by the Secretariat and the replies have been forwarded to the Sub-Committee. Member Governments were further apprised of the Council's opinion that certain of these fisheries should be the subject of technical assistance, especially those which depend on migrations which periodically fail for little known reasons.

C52/24.3(10)

In respect of *Taxonomy*, steps have been taken for the drafting of the different sections of the proposed hand-book on the economically important species and many of these sections are now in the process of editing.

C52/24.3(11)

In accordance with the Council's directive, an approach was made to the Science Co-operation Office of UNESCO for South East Asia and it was ascertained that, for the time being, there were no scholarships available for taxonomic training in museums or other institutions.

C52/24.3(12)

In the field of *Fish Culture*, the United States Government has announced the completion and dispatch of a bibliography of the publications available on weed control and it is hoped that this will be available at the 5th Meeting.

C52/24.3(13)

Governments which had so far given no information on the pollution of natural waters were circulated shortly after the Meeting and replies have been received from Ceylon, India, Netherlands, New Guinea, Pakistan, the Philippines and U.S. territories (Hawaii). This information is in the hands of the Fish Culture Sub-Committee.

C52/24.3(14/15)

Member Governments were duly requested to provide information regarding fish associations and optimum densities. Most of the replies indicated that little work had been done on these problems although some information was provided by Cambodia, India and Pakistan, which has been communicated to the Sub-Committee. The Government of the Philippines has indicated that, as a result of the suggestion implied by this Council Resolution, research is now being planned along these lines. Attention is called to the paper submitted to this Meeting by Mr. S. Y. Lin, FAO Fish Culturist assigned to Haiti, on these aspects, in accordance with the Council's wish.

C52/24.3(16)

In accordance with the Council's desire, the paper relating to an Internatonal Fish Fry Exchange was circulated to Member Governments with the request that consideration be given to this matter. Comments were received from Ceylon, India, Pakistan and the Philippines and from the British territories of Malaya, Sarawak and Hong Kong, all of which were favourable to the establishment of such an exchange.

C52/24.3(17/18)

The request for information on the area of cultivable waters was circulated to Member Governments. Completed questionnaires have been

received from Netherlands, New Guinea, Philippines and Viet Nam, which are in the possession of the Sub-Committee. The United Nations Economic Commission for Asia and the Far East (ECAFE) has replied that it is unable to supply the information required.

C52/24.3(19)

Regarding the *Hilsa* Committee, the Council's recommendations were communicated to the Governments of Burma, India and Pakistan. The Government of Burma has submitted a study on the Hilsa Fishery of the Mergüi district. The Government of India has communicated with the Governments of Burma and Pakistan regarding the possibility of forming a co-operative research unit.

B. Technical Committee II

C52/25.1

In the field of *Food Technology*, the Sub-Committee was requested to give attention to the matter of Seaweeds in the course of its work. The Governments of Japan and Korea were requested to furnish information. The Seaweed Research Institute at Inveresk, Scotland, was contacted and a fruitful correspondence and documentation has resulted. Attention is drawn to the paper on Agar-agar presented by Yanagawa and Tanii at the 8th Pacific Science Congress and available as Contributed Publication No. 4 at this Meeting.

C52/25.1(1)

In the matter of *Gear*, Messrs. Bottemanne, Tran Van Tri and Umali were requested to collaborate in the testing and application of the key developed by Mr. T. W. Burdon. A paper from Japan containing suggestions on gear classification is presented at this Meeting.

C52/25.1(4)

Information on the problem of net and gear preservatives was supplied on the Secretariat's request, by the Governments of Australia, Cambodia Hong Kong, India, Pakistan and Sarawak, and a bibliography was sent by the U.S. and is in the hands of the Sub-Committee.

C52/25.1(5)

The Council's wish to be informed as to the availability of fisheries engineers was communicated to the Fisheries Division, FAO (see "Technical Assistance" below).

C52/25.3

The Sub-Committee for *Socio-economics* requested to concentrate on improvement of m ing conditions and a Marketing Symposiun been arranged in connection with this Me The Council's directives that the FAO Fis Division be contacted regarding the provisio marketing specialist was complied with but not possible under present budget conditio supply such a specialist on a regional basis present time. It is outside the functions o Secretariat to contact "other sources of tec assistance".

All other directives of the Council exp in subsidiary resolutions were put into exec During the year November 1, 1952 to Octob 1953, 1,341 letters, 53 circular letters and 26 grams were despatched by the Secretariat.

VI. CO-OPERATION

4.21 United Nations Organization

Contact has been maintained with severa tions of the Economic Commission for Asia an Far East, especially with the Bureau of Flood trol under the directorship of Dr. Shen-yi, has recently expanded its scope of action clude all aspects of the development of river resources. The Executive Committee held ings in Tokyo with Dr. C. Y. Li of the Ind Development Division and Dr. K. Martin Survey Section of ECAFE.

It has been the concern of your Commit draw attention to the complex nature repercussions of such schemes, some ben others harmful, on the freshwater fis and to the dangers of generalization, and especially of adopting without further stud construction of devices such as fish ladders may have been used more or less successfu temperate waters to enable fishes of esse different life habits to surmount river barrier

There is still insufficient information reg the life history of the economically imp tropical freshwater fishes to enable constr conclusions to be drawn and it is obviously dan to attempt generalizations. It is believe Governments should be urged to assign biologists to this task without delay so that me may be adopted in the earliest planning sta river development schemes to take the fulle vantage of the new conditions created, recourse as necessary to technical assistance.

The Secretariat has been invited to pre short chapter for the use of river enginee

administrators for incorporation in the comprehensive manual which is in the course of preparation and it is hoped that a draft of this may be available at the Meeting.

Liaison has also been maintained with the Inland Waterways Sub-Committee, which plans to hold a training centre and demonstration project for inland water personnel.

4.22 Food and Agriculture Organization

Arrangements were made by the Secretariat for the Director-General of FAO to contact the Director-General of UNESCO regarding the Council's proposal for an international oceanographic co-operative project in the Region and this is dealt with elsewhere. The Council's Food Technology Sub-Committee has had correspondence with the FAO Interim Committee on Fish Handling and Processing.

Close contact has been maintained with, and guidance received, from the Fisheries Division and also with the General Fisheries Council for the Mediterranean, which held its 2nd plenary meeting from October 26-29, 1953 and at which Dr. G. L. Kesteven acted as observer for the Indo-Pacific Fisheries Council. The Summary Report of this Meeting is available as Contributed Publication No. 9.

The Council was represented by its Chairman, assisted by the Secretary, at the FAO Pre-Conference Meeting held at Bangalore, India, from 27 July to 5 August, 1953. The following is the text of the address given by Monsieur Serene in introducing the subject of fisheries :

" I consider it an honour, as Chairman of the Indo-Pacific Fisheries Council, to have been called upon to introduce the important subject of Fisheries at this Meeting.

" The Fisheries Division, which sponsored the formation of the Council, has in the basic working paper given the Delegates a general over-all picture of the Organization's targets and accomplishments in this field ; a brief statement has also been tabled by the I.P.F.C. informing you of the ways in which the Council contributes to the aims of F.A.O. in the Region. The belief is there stated that such regional bodies will tend more and more to be called into consultation in all major fisheries questions, and I sincerely hope that this may be so.

" It has also been emphasized that fish has quite a special place in the diets of the peoples of South and East Asia. It is, in fact, second only to rice in importance, and in most sectors it takes first place as a source of animal protein and other elements essential to health. Fish is, moreover, a relatively accessible crop, which although it demands rather a specialized kind of harvesting, occupies no land and usually requires no tilling or sowing.

" Nevertheless, although fish is a free gift of nature, or perhaps because of it, this great resource has, with notable exceptions, received little attention from administrators, and the action of Governments in this respect tends to lag behind the efforts made in other phases of their national economies.

" Perhaps because the actual fishing operations take place out of sight of those on land, it has been considered sufficient that the fishermen should continue to bring in from the sea more or less adequate quantities of fish, without regard to the return per unit of effort, to the over-fishing of valuable stocks, or to the necessity to find new fishing grounds.

" Another important activity which has only recently begun to receive attention is fish marketing. Fish is a highly perishable commodity and, if it is not consumed quickly, or if its deterioration is not arrested, it will spoil. It must be admitted that even in many of the larger cities of the Region, the conditions under which fish is marketed leaves much to be desired, and since ice has in the past not usually been available, much of the fish consumed in the region is either salted or smoked or converted into fermented pastes and sauces.

" Since consumer tastes and habits play an important role, the necessity has been realized in many countries of perfecting these traditional processes and of establishing standards. However, with the greater availability of cooling methods and better transport, it is hoped that more and more people will consume fresh fish, especially in the inland areas.

" It will therefore be seen that the development of transportation and processing must march hand in hand with the improvement of the actual fishing operations ; in fact, increased landings at the ports may be of little utility if they merely result in a local surplus and low prices for the fishermen while inland areas continue to suffer from a shortage of fish.

" Even assuming that the most efficient methods have been used in the capture, transportation and marketing, there are still many by-products which are not suitable for human consumption. In some parts of the region these are thrown away ; efficient operations would ensure that they are utilized in the form of fish meal, flour, fertilizers, etc. It has, in fact, been proved that the proper use of these waste products may well convert a losing fishery into a profitable one.

" Perhaps the field in which the most visible practical results have been seen is that of fish culture in ponds and rice fields, many countries having now carried their efforts in this direction to the level of the farmer.

" It will be appreciated from the above that much still remains to be done by Governments in the field of fisheries. It is true that almost all the Member Governments of the Indo-Pacific Fisheries Council now have some form of fisheries administration, even though in some cases this may consist of only one or two officers ; there are, of course notable exceptions, such as India and Japan, where a comparatively large staff of fisheries officers are working, and in those cases it merely remains to direct the resulting administrative measures in the right direction.

" It is, however, a fact that, in about half the countries of the region, there is no reliable statistical record of commercial fish landings, while almost without exception it is impossible to estimate the amount of fish which is caught and consumed at the subsistence level. In these circumstances, it becomes difficult for Governments to assess with any degree of accuracy the requirements and deficiencies of the industries or to take measures for their improvement.

" In fact, it may be said that, in general, our knowledge of the fisheries and of the natural conditions surrounding them are still fragmentary. It is for this reason that the Council, concurrently with the Government of Japan, has recommended at the most recent UNESCO Conference that an international unit be formed for the coordination of practical oceanographic work in the Indo-Pacific Region. This project is to be studied by a panel of experts which has been convened by UNESCO to be held in Manila later this year.

" In the field of inland fisheries, again our scanty knowledge of the habits of wild fishes makes it impossible to predict what will be the effect on the fisheries resources of the numerous river development schemes which are being planned in the Region. Only the advice of competent biologists, based on extensive field work carried out in the earliest planning stages, will make it possible to avoid a repetition of the errors committed in countries outside the region in this respect due to short-sighted policies.

" In view of the many gaps in our knowledge, the Council therefore believes that urgent need exists for the encouragement of fisheries administration and that this should be based on a hard core of workers having a certain degree of technical training. To this end, the Council has been actively engaged in recommending the holding of a se of international training courses. I am happy say that the Fisheries Division, in spite of sev budgetary handicaps, has given the most sympath attention to the Council's recommendations this respect and that Governments, realizing value of this type of training, have likewise indica their endorsement by the practical means of send some of their most promising workers as train

" The Council moreover believes that it contributed to the state of knowledge, within ex ing possibilities, through its periodical Meeti of fisheries workers and also by its committee w between Meetings, and that it has significa advanced the aims of the Organization in compi and disseminating information, in reducing wa and losses, in increasing the yield of the sea anc the improvement of nutritional standards.

" In this latter respect, while an increas fish landings will in itself contribute in no s degree to the improvement of general living co tions, the Council believes that it has a special ponsibility in respect of the living standards of section of society constituted by the fisheries op tives themselves.

" While fishing must essentially involve s element of risk and the return on the capital inve in the industry must always take proper accoun the possibility of loss and deterioration of the used, it has been apparent that in many sector the Region, the financing of fisheries operations not been carried on at the most economically b ficial level, because it has traditionally invo a large number of individual investors, each of w has required a considerable return on his inv ment in order to make a living. The financin the fisheries on a somewhat broader scale and elimination of much of the risk will, it is ho enable fishermen to enjoy a more rational shar the retail value of the fish they catch, and th turn will make them better producers. This require some degree of financial and administra assistance from governments and banking ins tions in the early stages.

" I should like, in closing these introduc remarks, to emphasize that the Indo-Pacific Fish Council is constituted by the same Member Gov ments represented at this Meeting and to req that your respective Governments continue to m the fullest use at all times of the Council in the s tion of their fisheries problems".

The Fisheries Adviser to the Governmer India reviewed the progress in fish culture and st that it was still premature to say whether Ti would be a suitable species for India. In

eld of marine fisheries, a successful mechanization rogramme had been undertaken and research on uitable types of fishing craft was being undertaken vith FAO assistance. Measures were being taken o improve transport and marketing conditions, nd extensive research and training programmes ad been undertaken. Dr. Chopra believed that he valuable information which had been collected nd disseminated by the IPFC should now be im-lemented through practical measures through the romotion of international activities, which might nclude investigation on the stocks of *Rastrelliger* nd the Oil Sardine and the possible effects of the najor hydro-electric projects on the fisheries. A esolution was adopted recommending " that the Organization should profitably direct its attention o initiating practical programmes of co-ordinated esearch in relation to problems such as the above vhich are common to more than one Government ", nd " that the efforts in promoting training courses e intensified, with special reference to the training f master fishermen in the use of mechanized fish-ng methods ".

The 7th Session of Conference of FAO met in Rome from November 23 to December 13 and the Director-General reported in his opening address hat during 1952/53, total agricultural production vas about 7% higher than the average of 1948/50, epresenting an average production increase of bout 2% per year, or slightly more than the annual ncrease of population of 1.4%.

The Conference reviewed the work carried out n the field of Fisheries during 1952 and 1953, and xamined the programme for 1954 and 1955. It vas noted that an extended description of the ationale on which the programme is based is given in n article published in the Fisheries Bulletin, Vol. , No. 5, September-October 1953, entitled Improving the Fisheries Contribution to World ood Supplies ". The Conference considered this locument to be valuable to Member Governments nd to the fisheries industries and services through-ut the world and the hope was expressed that it vould be reprinted in both the scientific and the rade journals devoted to fisheries. The Confer-rence commended the Director-General on the im-lementation of the programme to date and express-d the view that it had contributed materially to in-reasing the world's supply of animal protein and ther foods. It recognized the difficulties—and oted the impossibility in many respects—of measur-ng in precise figures the increase attributable to he work of the Organization, but the hope was xpressed that by the time of the next Conference ome progress will have been made in overcoming hese difficulties. The Conference drew special attention to the following aspects of the programme of work for the next two years.

Work in the field of fisheries biology during 1952 and 1953 was carefully reviewed. The Conference considered that there were two phases of activity in this field which could contribute tangible results in a short time towards relieving shortages in protein deficient areas, namely, the improvement of fish culture practices and the management of inland fisheries. Experience in these areas indicated the urgent necessity for the continued guidance to member governments in their management programmes.

The Conference noted the series of events which had led to the under-staffing of biologists responsible for this section of the programme and considered it of the utmost importance that the establishment should be brought up to full strength as soon as possible. The Conference emphasized the value of the preparation of a world series of fisheries maps in connection with the Survey of Marine Resources and suggested that this work should be given full priority.

The Conference recognized the importance of the development of fishery surveys which are of interest and benefit to all nations ; it considered that the development of an international approach to this very important subject might best be advanced by action initiated by the Organization with a view to international co-operation in the conduct of survey operations especially in unexplored areas. It was accordingly recommended that proposals for such international action should be placed before the Meeting on Fishery Resources, which it is proposed to convene in 1955.

In examining the programme of work for fisheries technology, the Conference commended the procedure which has been followed of bringing together experts and technicians in international meetings, as for example in the recent successful Fishing Boat Congress held in Paris and Miami in late 1953.

The Conference considered that amongst the deterrents to fisheries development is the lack of general knowledge of improved types of fishing gear and their use and attached high priority to the work proposed. The Conference emphasized that the present attention to the needs of particular regions for specialized technological advice should be continued, since only in this way can the work be most effective.

The programme relating to fisheries economics and statistics was carefully considered and the close relationship of this work with that of the rest of the fisheries programme was fully recognized. The

Conference was of the opinion that member countries should do more to assist in the provision of comprehensive and detailed information and statistics in order to enable the work of FAO to be carried still further in this field. It emphasized that the solution of marketing problems and the organization of more efficient distribution arrangements were of an importance equal to increasing production, in view of the urgent need in many areas to provide the incentive for expanding fish production and consumption. It hopes that the documentation resulting from the Hong Kong Fish Marketing Training Centre to be held in 1954 would afford material assistance in this respect. The value of the Yearbook of Fisheries Statistics was stressed.

The Conference reviewed the programme drawn up for regional activities. It was emphasized that where similar bodies are not already in existence Fisheries Councils provide an excellent means of establishing contacts between fishery experts and advancing the development of the fisheries in their particular areas. The difficulty of financing these Councils with their extending activities was appreciated and it was considered that in the future the participating countries might reasonably be asked to contribute part of the costs incurred by the Organization in its role as Secretariat to these bodies.

The Conference took particular note of the progress which had been made in developing the Fisheries Bulletin. It felt that an extremely high standard had been attained and it hoped that careful consideration would be given to every possible means of expanding the existing distribution. Finally the following Resolution was adopted:

The Conference —

Having reviewed the activities of the Organization in the field of fisheries

Commends the Director-General for the results achieved, and

Having examined in detail the Programme of Work and Budget for 1954 and 1955 in the field of fisheries as submitted by the Director-General

Recognizes that there exists a high degree of integration between the different aspects of the programme and that, therefore, it would be difficult to introduce significant amendments or alterations without a careful appraisal and recasting of the financial details of the whole programme, but

Agrees that in the event of any revision of the programme becoming necessary in the course of 1954 and 1955, due to unforeseeable c stances, any modification should be left discretion of the Director-General a such case,

Wishes him to take into account its vie projects likely to effect quick results, s the promotion of fish cultural practice proved management of inland fisheries towards the improvement of fishing landing, marketing and distribution fa fishing gear and methods, especially in co where there is need to increase protei supplies for the indigenous population, be given preference,

Expresses its satisfaction that the figures penditure in the budget for each gro projects are well founded and represe minimum of expenditure on which th gramme for fisheries work, as described reasonably be conducted and, therefore,

Approves the Director-General's propose gramme of Work and Budget for 1954 an in the field of fisheries to the extent th expenditure involved is compatible wi general level of the Budget adopted Conference.

4.23 United Nations Educational, Sc and Cultural Organization (UNESCO)

C52/9.2(2)

Close relations have always existed sin formation of the Council with this United N Agency, which has usually been repr by an Observer at Plenary Sessions. C Liaison Officers with UNESCO were ap at the 4th Meeting in New Delhi, Djaka Manila.

C52/23

The Council was concerned, at th Meeting, with the lack of information on c graphy as it affects the fisheries and the Se was directed to approach UNESCO on this As a result of the Council's action and a suggestion at the UNESCO Conference Japanese Government, UNESCO called t a Meeting of Experts which conven Manila immediately prior to the 8th Science Congress in November, 1953, to the advisability of such an international co tive project. Technical Committee I was re to undertake meanwhile a further examina the needs for such a project and will rep results at this Meeting. This Meeting o sultants was held at the United Nations B

lanila, on November 12 and 13, 1953, Dr. P. uger of UNESCO being elected Chairman and e Secretary, IPFC, Rapporteur. Also present ere the three members of your Executive Com- ittee, the Chairman and Rapporteur of Technical ommittee I, Dr. N. K. Panikkar (India) and Mr. A. Tubb (Hong Kong), eight other consultants d three observers. Using as a basis the Coun- l's "Report on Oceanographic Requirements," he Meeting of Consultants arrived at the following nclusions :

"The MEETING OF CONSULTANTS jointly convened by UNESCO and FAO in Manila

RECOMMENDS

"THAT there is an urgent need for the establishment of an organization in the Indo-Pacific Region for fundamental oceanographic research.

"THAT the term INDO-PACIFIC REGION be considered for the present purpose to include the water masses between the tropic of Capricorn and 35 degrees north latitude and between the east coast of Africa and 160 degrees longitude east of Greenwich.

"THAT the *objects* of the organization be to contribute to the advancement of scientific knowledge of the oceans, in the fields of physics, chemistry, geology, meteorology, and biology with the principal aim of providing the basic information necessary for the greater exploitation of the resources of the sea.

"THAT the principal functions of the organization in the pursuit of these objectives be defined as follows :

"1. **Documentation**

(a) The establishment of a register of the scientific personnel, institutions, vessels and projects concerned with oceanography existing in the Region.

(b) The compilation of a record of oceanographic data relating to the Region and its reduction to a form which could be usefully published or otherwise made available to workers in the Region.

(c) The establishment of a documentation and bibliography service in oceanography, for the Region.

(d) The maintenance of the closest possible relations with institutions having similar aims in other regions throughout the world.

"2. **Personnel**

(a) The scientific training of graduate students.

(b) Technical training in oceanographic procedures.

(c) Interchange of scientific personnel for the purposes of advising, lecturing, teaching and research, both intra-regional and inter-regional.

(d) The organization of symposia on subjects related to oceanography.

"3. **Research**

(a) The establishment of arrangements whereby national programmes may be encouraged and co-ordinated and methods and equipment standardized.

(b) The establishment of a consultative service available for the use of Member Governments in the planning and execution of their oceanographic programmes.

(c) Entering into research contracts and/or the granting of subventions to institutions to assist them in the aspects of their national programmes which bear on the organization's co-ordination programme.

(d) Research projects to be carried out by the organization itself, including the operation of vessels, either the property of the organization or on charter.

"The Meeting of Consultants moreover

"RECOMMENDS

"THAT the above organization be established under the joint sponsorship of UNESCO and FAO by means of a Convention to be signed by the Governments within and without the area above defined which are interested in the development of oceanographic science in the Indo-Pacific Region.

"THAT the governing authority of the organization should be a council of qualified scientists representing Member Governments, constituted in a similar way to the Indo-Pacific Fisheries Council, who may be assisted by advisers.

"THAT the governing authority should report annually to the Conference of UNESCO and FAO.

"THAT provision should be made for the constitution of suitable technical committees.

"THAT invitations to be represented by scientific observers at the meetings of the governing body of the organization shall be sent to Governments which are not contributing members of the organization but which are members of UNESCO and/or FAO, and to such international scientific institutions as the governing body may direct.

" THAT the organization be provided with a SECRETARIAT and with the financial resources necessary for the carrying out of its functions. The Meeting of Consultants, in recommending these functions contemplates that the secretariat might, for the time being, not be able to extend its activities to all the phases mentioned and would be obliged to limit its operations in the first place to the more essential matters according to the availability of financial resources. The Meeting firmly believes, however, that the programme should be an expanding one.

"THAT the secretariat of the organization should act in the closest liaison with the INDO-PACIFIC FISHERIES COUNCIL which is charged with similar responsibilities in the field of applied fisheries science and that the secretariat of the organization might most conveniently be located during the formative years as closely as possible to the seat of the Council so that the most complete interchange of information and results may be achieved. The Meeting believes, moreover, that library and documentation facilities might be held in common with the INDO-PACIFIC FISHERIES COUNCIL secretariat and that it might be advantageous, in the interests of economy and the avoidance of duplication of effort, that the meetings of the governing body be convened, insofar as may be practical, consecutively with and at the same place as the meetings of that COUNCIL.

" THAT the execution of the suggested programme of co-ordinated oceanography be carried out principally through the agency of the existing national institutions and those which may be created in the future and that it would be advantageous if Member States could, so far as may be possible, authorize such institutions to collaborate in this sense with the secretariat.

" THAT the essential co-ordinating functions of the organization could be carried out on the basis of a tentative initial yearly budget of U.S. $70,000 (seventy thousand United States dollars); if the initial yearly budget were increased to U.S. $100,000 this would permit the carrying out of a limited number of specific short-term research projects, and that an annual budget of $200,000 would be required if research were to be carried out on the basis of an ocean-going research vessel (this does not include the cost of the vessel).

" THAT this budget may be derived from:

(a) Contributions of Member Governments of the organization

(b) Subventions from the United Nations and its specialized agencies, from non-governmental scientific bodies and from private foundations.

" THAT a senior qualified scientific wo
eventually appointed as the Director of th
nization and that he be nominated from a
possible candidates which will be drawn up
guidance of the appointing body by a co
consisting of Professor A. C. Hardy (Cha
Professor Th. Monod and Professor Hans
son which will canvass suggestions from i
persons and be convened jointly by UNES
FAO some time in 1954.

" THAT the technical and legal details
templated above be incorporated in a draft
tion to be prepared jointly by UNESCO a
and that this be considered, revised and ev
signed by the meeting of accredited dele
Governments contemplated in the UNESC
lution passed at Paris in November, 1952 a
ing the holding of this Meeting of Consult

" THAT the Meeting, after conside
number of Governments within and wit
Region which might become signatories to
vention, believes that the number of ratific
be given in order that the organization c
existence might be five."

C52/24.3(11)

Three further lines of contact with U
were recommended by the Council. T
relating to the training of taxonomists in
subjects at museums, was not found to
able at the present time. The second, re
the printing of taxonomic charts of the C
and Mullusca, was taken up by UNESCO a
charts are available at the Meeting as " U
Marine Biology Chart " Nos. 1 and 2. T
point, viz. UNESCO co-sponsorship of
posium on Plankton at this Meeting, has b
successfully pursued and it is to the goo
and financial assistance of that United
Organization that the Council is indebte
presence at this Meeting of qualified
workers from within and without the Regi

4.24 8th Pacific Science Congress.

The Executive Committee having hel
Meeting for the period in Manila im
prior to this Congress, all the Members we
fore able to attend and represent the Coun

The following papers were presented th
Council and are made available as Co
Publications at this Meeting:

1. " Oceanography and Fisheries "
Kesteven.
2. " Fundamental Studies on the Fish
by N. Y. Kawamoto.

3. "On the Circulation in the North Pacific in Relation to Pelagic Fisheries", by M. Uda.

4. "Studies on Agar Agar in Japan" by T. Yanagawa and K. Tanii.

5. "Oceanographical and Fisheries Research in India" by N. K. Panikkar.

Some 86 papers in all were presented at the various mposia of the Oceanographic Division (includ-g one on the Marine Provinces in the Indo-Pacific gion sponsored by UNESCO), and will eventually printed. Printed abstracts may be consulted the Secretariat.

A series of resolutions were drafted as follows:

1. The Congress notes with interest that the oceanographers attending the Eighth Pacific Science Congress propose to establish an Oceanographic Institute of the Pacific.

2. The Congress strongly supports the proposal, recently examined by the special UNESCO meeting of consultants on oceanography, to create a legally constituted inter-governmental organization for oceanographic research in the Indo-Pacific region.

3. The Congress urges member countries (a) to exert every means to develop research programmes upon which may be based sound policies for increased development and wise use of marine resources. (b) To develop the fullest international cooperation in the management of marine resources so that they may be maintained permanently.

4. The Congress draws attention to the following types of oceanographic study which can be maintained at a small cost, and whose results when correlated with other available data can provide large returns: (a) Daily observations of surface sea water temperature and salinity which can be made at light stations, and by commercial shipping lines. The work may be extended to daily observations of the nutrient and respiratory elements, and the state of the sea. (b) Study of specific organisms of academic or economic interest in the locality. There are many species which have been taxonomically described, but whose life history, habits, and economic value are unknown.

5. The Congress commends the excellent research work of the Bureau of Fisheries of the Philippines and respectfully suggests to the Government of the Republic of the Philippines that it explore the possibilities of establishing further oceanographic and fish culture research through the provision of extended facilities.

A device for the simple and rapid determination of salinity based on an adjustable hydrometric float, was demonstrated by Mr. D. H. Rochford (Australia).

4.24 International Council for the Exploration of the Sea.

The Council was represented at the 41st Meeting of the ICES held at Copenhagen from September, 28 to October 6, 1953, by Dr. G. L. Kesteven, Chief Marine Fisheries Section, FAO Fisheries Division. This Meeting was attended by some 130 participants and more than 50 papers were submitted. Films were shown on the life history of the eel and on some new equipment for tagging herrings. New equipment for work in hydrography, planktonology and biology was demonstrated. For the most part, the work of committees was devoted to receiving accounts of investigations in progress and reviewing the situation of the fish stocks in each of the Council's sub-areas. Special attention was, however, paid to conservational problems by certain committees, and recommendations were made in regard to regulation of fishing gear and minimum size of capturable fish. An address was given by Dr. Kesteven regarding the interests of FAO and IPFC in the aquatic resources, which is available in the Secretariat.

VII. COUNCIL'S REPORT TO FAO (4.3)

C52/15

In accordance with the various resolutions passed under Agenda Item 15 at the 4th Meeting, the Executive Committee's Report, as adopted at that Meeting, was suitably arranged for presentation to the Organization. Two hundred copies of Part I of the Printed Proceedings were despatched to the Organization direct from Madras printery.

There will be no FAO Conference in 1954 at which the Council's report might be directly submitted as was the case in 1953. It is therefore proposed that the Summary Report of this Meeting be forwarded by the Secretariat to the Director-General FAO, and eventually a sufficient number of copies of the Printed Proceedings.

VIII. PUBLICATIONS AND EDITORIAL POLICY (4.4)

4.41 *Proceedings :* Part I of the Proceedings of the 4th Meeting was circulated shortly after the termination of the Meeting. It is expected that Part II will be available in printed form at this Meeting.

4.42 *Special Publications :* The re-setting of the type of Special Publication No. 2 " Fish Culture in Indonesia ", which became necessary owing to the unsatisfactory nature of the 100 copies run for the Fish Culture Seminar held in Indonesia in 1952, has entailed the correction of further printer's errors. The final proof is now awaited from the press and it is hoped that the printing may be completed before the 5th Meeting. Much basic material is to hand from Dr. Hardenberg for incorporation in the work on the important groups of economically important fishes and it is hoped that this may be issued between the 5th and 6th Meetings.

C52/17.1
C52/24.3(5)

4.43 *Handbooks :* The Council, at its 4th Meeting, determined a provisional order of priority for ten handbooks which it was proposed should appear under the aegis of the Council. A Handbook of Field Procedures was also called for under Resolution 24.3(5). A Handbook on the Cultivable Fishes of the Indo-Pacific Region is in the course of preparation by Dr. S. L. Hora under an arrangement with the Fisheries Division, FAO, and it is hoped that this may be made available for publication as part of the Council series. The first two chapters have been circulated to workers in the region for comments but publication of the complete work will not be practicable until the middle of 1954.

Dr. G. L. Kesteven, in his capacity as General Editor of Handbooks, has informed the Executive Committee that work on these Council publications is well under way and that, although it is unlikely that any manuscript can be placed with the printers in 1953, substantial progress is predicted for the early part of 1954. Much progress has been made in the crystallisation of ideas and in establishing important principles which should determine the future development of the project. It is recommended that there should be a first volume dealing with the general definitions and scope of fisheries science and its component parts and it is hoped that a draft of this volume may be available for the 5th Meeting, together with a detailed synopsis of each of the other volumes.

The Council established the priorities set out on page 11 of the 1952 Proceedings in the full realization that the programme of Handbooks w long-term nature and it is felt that, except f revisions as the Council may wish to mak time to time, the implementation of these be now placed in the hands of the Editor of books over a period of several years.

The Executive Committee has, neverthele concerned at its Meetings during the curre with the fact that during the short period the 4th and 5th Meetings it has not been to utilize to the fullest extent the printing tion provided by the Organization.

In the field of Food Technology, some has existed in the minds of your Executive mittee as to the proposed status of the thre lications which were proposed by the Co its 4th Meeting, as follows :—

1. Food Technology Handbook
2. Fish Processing Handbook
3. Classification of Food Processing M

Considerable correspondence has been ex in regard to these three projects which, opinion of the Committee, appeared to The interpretation which has been placed Council's directive has been that whereas t Technology Handbook would record th principles involved, and would require so for its preparation, the Fish Processing should appear as a " Special Publication " than as a " handbook " and would be a com of the application of those principles in th Pacific Region, which could be brought o relatively short time, provided an auth available. The Committee nevertheless after perusing the prospectus approved at Meeting and a revised prospectus submitte Fisheries Division that certain sections w incomplete without some reference to the ing of fish in the Region. It was therefore d withhold action on the preparation of these pending the recommendations of the C Sub-Committee, which has now given its that two publications are necessary. Thi is now submitted to the Council.

There would appear to be a consensus of that the limited number of processing makes the third project (i.e. the taxonomic unnecessary and this would, in fact, be ad provided in the List of Contents of the ot

4.44 *Bibliographic Work :* The Executi mittee has kept in mind the Council's po this work should proceed along two lines, as

(a) Sector Bibliographies, consisting of stock-taking of the literature w appeared in the Region, and

(b) Current Bibliographies, which would consist of lists of works subsequently published.

a) *Sector Bibliographies :*

Between the Council's 1st and 2nd Meetings, he Secretariat took active steps to compile a ibliography of the Western Sector (Burma, Ceylon, ndia, Pakistan, Thailand). This was reviewed at ronulla by a specially appointed Committee, hich recommended that " Sector Bibliography sts as made for the Western Sector and comnenced for the Central Sector by the Secretariat hould be continued ". The Executive Committee ecommended at the 4th Meeting that these Sector ibliographies should be listed by author and date nd that they should be indexed subject-wise.

It was also decided at the 3rd Meeting that the ibliographies should be submitted to a panel of xperts. Nominations to this panel were received rom India (8 specialists), Thailand and Burma, hile Dr. H. K. Bhatti, the Council's Bibliographic orrespondent for Pakistan, has recently submitted list of publications for that country.

Apart from the completion of the Bibliography f the Plankton of the Western Sector by Dr. anikkar, no response has been received from these anel members and they have recently been reminded of the Council's wishes. There are, however, now in existence other subject bibliographies hich have appeared in the region, notably on ilsa by Dr. S. Jones, on Fish Culture by Mr. . V. R. Pillay, on Chanos by W. H. Schuster, on ood Technology by Mr. K. Chidambaram and a ibliography of the papers of Dr. S. L. Hora which hould provide good material for the Western ector Bibliography.

As regards the Central Sector, the Secretariat ad, prior to the 2nd Meeting, brought together ome information in the form of library cards and hese have been added to from time to time through he co-operation of Dr. J. Westenberg and others. his information is, however, far from complete.

The Executive Committee is convinced that such ector Bibliographies would serve a useful purpose nd again recommends (see page 36, 4th Proceedngs) that the Council give serious consideration s to the means whereby this work may be brought o completion, in view of the present heavy comnitments of the Secretariat staff.

Another phase of the cataloguing aspect is contituted by Subject Bibliographies, and it was ecommended at the 4th Meeting that these should nly be issued in annotated form, since they would otherwise duplicate the subject indexes of the Sector Bibliographies. It is possible that this criterion may have to be reviewed in case means are not found of completing the Sector Bibliographies in a reasonable period of time.

(b) *Current Bibliographies :*

As was reported to the 4th Meeting, Bibliographic Correspondents have been named by Member Governments, whose task is to keep the Secretariat informed regarding fisheries papers which appear in their territories. These Bibliographic Correspondents have been circularized by the Secretariat with the object of obtaining abstracts of such papers as appear in the Region, in compliance with point 6 of Resolution 16 of the 3rd Meeting to the effect that bibliographies shall be printed in the form of library cards, and it is hoped that the Secretariat may from time to time be able to give a limited abstracting service in connection with its Current Affairs Bulletin.

The Fisheries Division, FAO, has offered to prepare a selected, annotated bibliography on Fishing Gear as a contribution to the 6th Meeting.

4.45 *Other Publications :*

(a) *Occasional Papers :* The following three occasional papers have been circulated :

(*a*) The Fishing Industry at Sakanthit.

(*b*) A General Pilot Survey of the Inle Lake.

(*c*) Summary of Investigations carried out in India on Chanos.

(b) *Accession Lists :* Monthly lists of accessions to the Regional Office Fisheries Library have been issued.

(c) *List of Periodicals :* All sections of this proposed publication excepting that for Japan (which has now been received) are in the final proof stage.

(d) *Current Affairs Bulletin :* Three issues of this Bulletin have been issued and a fourth is under preparation. More regular contributions from the Council's Administrative Correspondents would make it possible to bring out this paper with greater regularity.

(e) *Agreement and Rules of Procedure :* A revised issue of the Council's Agreement, Rules and Committees' terms of Reference is in the press and will, it is hoped, be distributed at the 5th Meeting.

(f) *Register of Institutions :* The bulk of the material for this publication is now ready.

Pricing of Publications :

The Secretariat has received during the year many requests for copies of Council Publications from institutions outside the region and from individual workers. While every endeavour is made to satisfy the former, the present system of distribution, which is on a free basis, will not allow the second type of demand to be satisfied. The Committee believes that these enquiries are an index of the growing status of the Council and feels that if a small extra number of all Council Publications could be printed for sale purpose, through the FAO Publications Section, and a price placed on these, circulation among workers to whom they are not normally available might be achieved.

IX. TECHNICAL ASSISTANCE

C52/25·1(5)
C52/25·3(2)

The Council's desire for information from the Fisheries Division, FAO, regarding the availability of fisheries engineers is noted above and a similar directive is given in Resolution 25.3(2) regarding the possible services of a marketing specialist. Both of these requests were communicated to the Organization.

In the case of fisheries engineers, the Division has given careful consideration to this matter and believes that this term covers such a wide range of activity that it is necessary to know precisely in what field governments wish to have assistance before being able to suggest the names of individuals who are competent from the numerous personnel which has offered to undertake work of this type. The cost of employing such people would, moreover, vary, depending on the individual expert's experience and qualifications.

With regard to the enquiry as to whether a marketing specialist could be provided, it has been ascertained that the ordinary programme of the FAO does not permit any action for the time being and it is hoped that the training centre for fish marketing proposed to be held in Hong Kong in 1954 will meet to some extent the need for assistance in this respect.

The Organization has, in fact, assisted a number of Governments in these fields under its Expanded Technical Assistance Programme. It is perhaps not out of place here to indicate that technical aid cannot, under the Organization's terms of reference, be given at its option, even when based on recommendations of the Council, but only by request of the Governments concerned. Fisheries departments in need of such international technical aid should therefore ensure that their requirements in this respect are communicated to the cor government agency charged with co-ordin such requests to international organizations

In 1953, a new system for the submis requests for technical assistance was inau by FAO. This involved the preparation of solidated request by governments covering in all the five technical fields of work of F duty in 1954. As a result, FAO received requests for 91 fishery experts and for 49 fellowships from 33 governments, and o sponsor three fishery training centres fro governments. The approval of all these would have required a budget of some $1,$ to $1,800,000. It was therefore only poss the light of the foreseeable FAO/ETAP bu 1954, to provide for 33 experts and 11 fell for that year and to hold two training cen an estimated cost of $363,000. These have been placed in Category I, while a fur posts will be established and 2 fellowships p in Category II if additional funds are forth

The Conference of the Organization, November 1953 sessions, considered the Ex Technical Assistance programme and note regret that all the assistance asked for could rendered under the limited budget, but neve congratulated the Director-General on the achieved.

Ceylon: The two FAO experts who are c ing the FAO/ETAP fisheries programme in will continue their assignments in 1954 in the keen demand among the fishermen for m zation. The training of fishermen in the and maintenance of engines is being planne

India : An assignment on fish culture an eradication methods was completed, and expert carried out a study on the improve fishing methods in the estuarine waters o Bengal. A naval architect has commenced off the lines of local fishing craft. It is h recruit two fisheries engineers in 1954 to duties in different States.

Malaya: It is hoped to include a fis technologist in the 1954 programme to ad Government on the most efficient utiliza fish waste.

Pakistan, West: Kurt Ohlsson of Sweden h compiling the records on country craft c earlier this year by K. H. Magnusson an models will be tested in Sweden. The G ment has under study the report of the FAO Engineer and Port Master on plans for the and transportation of fish and the design o

ish harbour. A report has been submitted by an AO refrigeration engineer on cold storage requirements.

Pakistan, East: A team comprising a commercial isheries consultant and a fish harbour specialist ave completed a survey of the distribution of fish upplies and improvement of fish handling.

Thailand: Dr. S. W. Ling of China continues to ssist the Government of Thailand in its freshwater ish culture programme. The distribution of fingerings to the public is increasing rapidly; public emonstrations and training courses are being onducted as well as experimental work in the culture f fish in rice fields.

There are further signed agreements and requests o be filled from Ceylon, India, Indonesia, Pakistan nd the Philippines, although it is likely that budetary restrictions will make it necessary to place ome of these in Category II.

Collaboration has been maintained as closely as ossible with technical assistance programmes eing provided in the region by other international gencies and Governments, among others by the oreign Operations Administrations (FOA) of the United States Government; assistance from overnment to Government by members of the olombo Plan Economic Development Programme; nd the technical aid provided by the Government f Norway in the State of Travancore-Cochin, outh India.

X. TECHNICAL INSTRUCTION

52/19

The Council, at its 4th Meeting, passed eight esolutions bearing on technical instruction, as llows:

1. School for Master Fishermen.
2. Fish Culture Seminar.
3, 4. Fisheries Statistics Training Centre.
5. Centre for Fisheries Administrators.
6. Gear Technology Training Centre.
7. Fish Marketing Training Centre.

Information has been received to the effect that he Division has given considerable attention to he matter of training centres which it may be ossible to hold under the aegis of FAO during 954. Owing to the expanding programme and the ever-increasing requests from Member Governments for Technical Assistance, which cannot be satisfied in their entirety from the proportion of the United Nations Technical Administration Funds available to the Organization, it has become necessary to restrict to two the total number of fisheries training centres throughout the world during 1954. While it is realized that each of the above projects is vitally essential to the development of fisheries in the area, and no attempt has therefore been made to establish priorities, the approaches made to Governments showed that the scheme which it would be possible to implement with the least delay would be the proposed Fish Marketing School and an Agreement is now under discussion with the Governments of the U.K. and Hong Kong.

It will therefore be seen that, as in the case of Handbooks, the fulfilment of the total of the Council's wishes in this respect is, as far as assistance from the Organization is concerned, of a long-term nature and it is assumed that the guiding principles of the Secretariat in its contacts with Rome will, at least during the next year or two, be along the lines laid down in the above Council Resolutions.

The Government of India has advised the Secretariat by cable of proposed Agenda Item 12.3 "Urgent Necessity of setting up a Centre in the Indo-Pacific Region for training Master Fishermen" and the Council will no doubt wish to give full discussion to this proposal.

As regards the first Fisheries Statistics Training Centre held in Bangkok, the Council's wish that the organizers be thanked has been complied with. As regards a second similar centre, Governments have been canvassed, at the request of the Division, with a view to ascertaining whether trainees would be forthcoming for such a second course and some replies have been received. It is probable, however, that this could not now be held in 1954.

The Director-General of Fisheries, Thailand, graciously extended an invitation, through the Council's Secretariat, for the participation of trainees from the Governments of Burma, Cambodia, Laos and Viet Nam in the Thai Fisheries Officers' Training Course in Fish Culture Methods held in May, 1953. Students from three of these countries successfully attended the course through assistance from the United States Technical Missions and the Executive Committee believes that this type of co-operation between technical assistance agencies should be encouraged to the fullest possible extent.

STUDY OF COUNCIL WORK & PROCEDURE[1]

In accordance with the directive given in Resolution 52/5[2] the Secretariat has given careful consideration to the conduct of the Council's work and submits the following analysis, which should be read in conjunction with the general review submitted to the 4th Meeting.[2]

It was the Council's primary concern, in that document, to ascertain to what extent the functions set forth in its Agreement had been effectively discharged, and whether the work performed had contributed, or was likely to contribute in the near future, to the increased availability of fisheries products through improved landings or better utilization.

In accordance with the Council's terms of reference as set out in its Agreement, it was believed that the discharge of these functions depended on (a) the identification of the problems, (b) the selection of such of these for Council study as hold promise of effective results, (c) the means whereby the Council's committees might substantially contribute to their solution and (d) where possible, the assignment of permanent technical staff for the co-ordination and application of results.

The Council believed that the scope of the technical and working papers presented by Member Governments at its Meetings is one of the principal criteria in assessing progress. These were divided for purposes of analysis into four categories, as follows :

D. Those describing phenomena
R. Reviews of accomplishments
M. Methodology papers
F. Formulation of problems

It was pointed out that the last two groups were most likely to contribute to the effective work of the Council, and that while purely descriptive papers should still be encouraged from those Governments which have so far submitted few contributions, increasing emphasis should be laid on those which formulate problems and describe procedures adopted or proposed to be adopted for their solution.

In pursuance of the above aims, it was proposed that the Council should give further study, at the present Meeting, to the following matters :

(1) That future Meetings might alternate between the site of the Secretariat and a host country, including that in which the Secretariat is located.

(2) That " Secretariat " Meetings woul centrate on the formulation of pro the encouragement of co-ordinat search and application of method the collection and dissemination o nical information (items a. to c. Council's functions).

(3) That Meetings in a host country centre on extension and encoura with special reference to the butions by the host government Council's aims and study of th fisheries problems and needs (it to i. of the Council's functions).

(4) That the work of committees shoul continuing task and not merely a of interest immediately prior to ings.

(5) That the Secretariat should reco measures for the simplification cedural work with a view to econ time and cost.

(6) That means be found of expandin ence facilities at Meetings.

As regards (1) to (3) above, apart fro siderations of budget and clerical assistan Council's library facilities are at present ex limited and it is improbable that they woul complete as those available in the fisheries ments of host governments.

Turning to point (4), the Secretariat has h contact with all committees with a view t taining interest in the Council's work. It h found that, as a rule, those persons who h ually attended Council sessions have given enthusiastic response, and this in itself spea of the co-operative spirit engendered by att at Meetings.

Committee work has, however, again du current year, fallen into three distinct cat

(a) those committees which have mai contact during the period and h mitted a substantial report on th in their particular fields.

(b) those which have, through pres heavy national programmes, no it possible to maintain contact respondence, the report havi

[1] Revised and presented as a Secretariat Document.
[2] Proceedings of the 4th Meeting, pp. 6, 24-26. and 49-52.

prepared by the rapporteur on scanty information, and

(c) Committees which have submitted no report.

While a satisfactory number of committees falls into the first category, it would appear that the Council may in the future find it necessary to eliminate from its worksheet certain items in regard to which no significant progress has been recorded, since non-functional committees are depressing to Council work.

The Secretariat, while hesitating to recommend which sub-committees might be considered to have achieved their purpose, believes that the present number of fourteen (10 in Committee, I, 4 in Committee II) to be excessive in the absence of co-ordination by full-time specialists and in view of the fact that many workers are under the present system called upon to serve on more than one committee.

This is reflected in the decision recorded in Resolution 52/10 that, insofar as committee work at Council Meetings is concerned, separate sessions of the numerous groups of Committee I tended to hold up the Council's business, and that therefore the Committee should, at Meetings, split into three panels only, dealing with the following matters :

A. Physico-chemical environment

B. Biotic-aquatic environment

C. General fisheries biology.

Careful consideration was given to this grouping, but the value of this division is not clear ; panel A would be restricted to hydrology ; while panel B would presumably be limited to plankton studies. The remaining eight subject committees would therefore gravitate into panel C which would be expected to deal with all the numerous problems relating to freshwater, estuarine and marine organisms. The following three panels are therefore now proposed :

(a) Inland Fisheries	To deal with Fish Culture (including *Chanos*), and *Hilsa*.
(b) Sea Fisheries	To deal with Oceanic Fisheries and Inshore Fisheries.
(c) General Biology and Hydrology (related to both the above)	To deal with Hydrology, Plankton, Miscellaneous Fisheries, including Seaweeds.

Some changes in terminology are suggested. As regards the sea fisheries, demersal and column fishes have at present no assigned place in the Council's work and it is proposed that an Inshore Fisheries Sub-Committee might deal with these aspects in addition to the neritic-pelagic fisheries. An Oceanic Fisheries Sub-Committee would deal not only with Tuna but also with other aspects of fishing on the high seas.

An Inland Fisheries group might well, at this stage, absorb the duties of the Fish Culture Sub-Committee as well as *Chanos* and, eventually, *Hilsa*, although no firm recommendation is made in the latter respect in view of the active programme of this last Sub-Committee.

Whereas panels (a) and (b) refer to fisheries which can be reasonably allocated as between marine and freshwater, the proposed panel (c) is environmental (as far as the fishes are concerned) but also includes organisms (e.g. prawns) which do not inhabit either element exclusively. Each panel would deal with the taxonomic problems relating to the groups falling within its terms of reference.

As regards Technical Committee II, there has been less proliferation. It still remains to be considered whether there are sufficient statistical workers in the region to constitute a committee, or whether the Socio-Economics and Marketing Panel might make such recommendations in this respect as might be proper from time to time. The following divisions of Committee II are therefore recommended :

(a) Craft and Gear

(b) Food Technology

(c) Socio-Economics and Marketing (including Statistics)

The question arises as to whether the Council may wish to continue to work during the year through Sub-Committees, which would group together into the above panels for Meeting purposes, or whether it would be more convenient to continue to work during the interim periods by means of these panels alone. In the latter case, it would be most important to bear in mind at all times the consolidated terms of reference of each group so that the various aspects of the fisheries may not be neglected. On the other hand, there would be no objection to each panel, if it so desired, forming domestic sub-committees, but it is believed that these should be small in order to work effectively.

The responsibility of the Council's Administrative Correspondent might, where possible, be

expanded to include the encouragement of interest in Council work at a local level, through meetings of members of the various groups within his country, and the Administrative Correspondent might, additionally, and subject to his Government's approval, maintain Council liaison with, and eventually accept co-option to, his National FAO Committee.

It has been suggested in correspondence that the committees of this and other Regional Councils might advantageously receive guidance during the year from branch specialists at FAO Headquarters. It is felt that such assistance would be of great value and the Council may wish to discuss the most appropriate means whereby advantage might be taken of this offer.

Formulation of the problems

It has been the object of the Council in making this study to determine the means whereby the problems might be better identified, pertinent data collected and action recommended. The following appear to be the principal channels open to the Council for the identification of the problems :

(i) Agenda items proposed by Member Governments.

(ii) Statements by delegations at Council Sessions.

(iii) Reports from Governments on the status of the industries.

(iv) Information obtained by committees.

(v) Technical papers submitted at Council Meetings.

It is believed that it is one of the functions of the Council's subject committees when reporting progress, to call attention to the outstanding problems, taking care, however, not to limit the scope of such reports to a yearly repetition of the existing problems without making suggestions for their solution.

It may be said that the Council has, in the past, always to some extent carried on its function of defining problems and these are recorded in many committee reports and council resolutions, and to some extent in the technical papers published.

Once the problems have been defined, the Council should then take action on such of them in respect of which it can reasonably expect to contribute to the development and proper utilization of the resources.

Collection of information

The next step is to collect together in one all the available information bearing on the pr including the results of national researcl grammes. This can be done either direc correspondence between the committee m themselves or by means of questionnaires to G ments through the Secretariat. It must be borne in mind that the collection of data own sake is not the primary object, but that t to which it will be put by the Council's com is the important thing.

Solution of the problems

Although the Council has been able to ass much information on the fisheries of the the collection of basic data is of little value means are found of arriving at useful concl and of applying the results in practice. Th cipal work of the Council will, therefore place subsequent to the two initial steps des above.

It will be recalled that among the functi the Council as laid down in its Agreement recommend, and also to undertake, co-op research and development projects. M Governments of the Council have not, up present, engaged in any joint investigations parable with the International Co-operativ Hybridization Project and it might be cons at this stage of the Council's evolution, w such schemes involving the commitment of and the employment of full-time specialists, not be desirable. In fact, the ability of the C and the willingness of Member Governm engage in such international co-operative me may well prove to be the touchstone of the cil's effective contribution to fisheries develc and the improvement of nutritional standarc

However, until such formal co-operative p are brought into existence, the principal available to the Council for carrying on intern research is through its committees. The w the Council must still therefore depend to extent on the successful operation of these w groups, which, for a number of reasons, ha always made their full contribution to the Co work.

It is realized that committee members present often fully occupied in their imn national fisheries programmes and that Governments may find it possible to assign w to the Council's special sphere of action, th is essentially of a voluntary nature. Never

proper consideration of certain aspects of the work assigned to committees would require the full-time attention of a number of workers over a long period.

It cannot be emphasized too strongly that the Council is constituted by its Member Governments and that, in the long run, it has no separate existence over and beyond the collective personality given to it by those Governments.

It is believed, therefore, that effective work of committee members will depend in the long run on their receiving authorization from their Governments to dedicate at least a portion of their time to Council work, and it is not unreasonable to suppose that workers participating in committees might eventually be instructed to direct their laboratory and other work towards the elucidation of certain of the problems submitted by Governments to the Council.

REPORT ON THE STATUS OF THE FISHERY INDUSTRIES

(*December*, 1953)

The conditions under which the fisheries operate and the general tendencies which were dealt with on a regional basis in this Committee's report to the Council at the 4th Meeting, remain essentially unchanged. It is, therefore, believed that the present report will be most useful if the status of industries is, for the purposes of this Meeting, dealt with on a country basis.

The total world catch in 1952 amounted to some 26.0 million metric tons, of which Japan produced 4.7 million tons and China an estimated 2.0 million. The aggregate output of the other countries of the South and East Asia region amounts annually to between 2.0 and 2.5 million metric tons.

Reliable statistical data on the fisheries of this region are lacking for most countries. Average figures indicate that the catch increased rapidly during the four post-war years, 1946-49. It should be stressed, however, that these increases reflect only the post-war rehabilitation processes. The level reached during the three years 1950-52 remained stabilized, with only minor local fluctuations. In all countries except South Korea the 1950-52 production at least equals the annual output during the pre-war years, while in Malaya the catch in 1951 was appreciably higher than the pre-war output.

Australia

Although Australia has a long coast line and an apparent abundance of tuna, this industry is little developed. Interest is, however, growing and trial shipments have been successfully marketed in the United States and the British Isles. The three major species of potential commercial importance are *Katsuwonus pelamis*, *Thunnus maccoyii*, *Kishinoella tonggol.*

According to the Statistics of the Commonwealth Director of Fisheries, the 1952 production of fish (whole fresh weight, including crustaceans and molluscs) was of the order of 37,100 tons* plus 50,629 bags of oysters, with a value of £A.6,140,262. Total imports of fisheries products were 21,200 tons** with a value of £A.4,983,000 consisting of 7,700 tons of fresh or frozen fish, 3,500 tons of cured fish (principally from New Zealand and South Africa) and 10,000 of canned products (principally from Norway and the United Kingdom). 3,300,000 lbs. of crayfish tails valued at £A.1,065,000 were exported to the United States.

The fisheries are mainly marine, and only tw true native freshwater species exist, although the is a programme of trout acclimatization. Tw companies operated 12 steam trawlers on the Soutl east Coast of Australia and Danish seining is carrie out by boats varying from 32 ft. to 70 ft. equippe with diesel engines. Pole fishing for barracout *Thyrsites atun*, is peculiar to Tasmanian wate while trolling is used for taking several species pelagic fishes. Long-lining, set-nets, purse sein and beach seines are also in use.

There has been a marked decline in the catch both the Danish seiners and steam trawlers over t last few years and at first sight it appears that, de pite the reduction in the eastern trawling flee from 5,500 to 4,000 trawler tons, the fish stocks a unable to stand up to the present intensity of fishin This is, however, offset by somewhat increas catches in other Australian States. In a number important species, e.g. the sea mullet and bar couta, production is probably limited by econon factors rather than availability and the most sign ficant species, the pelagic fishes, await large-sc exploitation for which the necessary investme is so far lacking. The Commonwealth Fisheri Officer has instigated conferences between Co monwealth and State authorities with a view conservation measures in respect of the tyger f head (*Neoplatycephalus macrodon*) and the sch sharks.

According to the latest census figures (Yearbo of the Commonwealth of Australia, No. 39, 19 there were some 15,637 persons engaged in t industry.

The Australian fish canning industry has, duri the last one and a half decades, developed int vigorous, progressive industry, estimated at a capi value of £A.1,000,000. The yearly producti from 17 canneries operating in 1952 catered to ab the one-quarter of the annual requirements.

The Australian Whaling Commission and th local companies are engaged in active whali The total catch for the 1952 season was 1,787 hun back whales.

Burma

There is still little information on the mar fisheries of Burma, beyond the information c

* Monthly Serial Bulletin, Fisheries Department, W. Australia.
** Communication from the Government of Australia.

ained in the official publication " Fisheries in Burma " by U Maung Khin (1944).

Fish landings in 1950 are estimated to have been 43,200 tons* presumably excluding subsistence fishing. Imports of fisheries products in 1952/53 were 10,711 tons and exports 760 tons.*

A joint fishing company has recently been established by Burmese and Japanese private concerns with a view to operating a commercial deep sea fishing enterprise in the territorial waters of Burma and the adjacent high seas, with a capital of 500,000 kyat. One trawler of 375 tons is to be chartered and two further vessels of 275 tons and 80 tons are to be constructed together with refrigeration storage and a salting and drying factory.

A study entitled " The Fishing Industry at Sananthit, Mergui District " by U Ba Kyaw, Union Government Fisheries Officer, was circulated as Occasional Paper 53/1 and information on the occurrence of *Hilsa* has been made available to the Council's Sub-Committee.

As regards the fresh-water fishes, a research station project has been initiated near the Hlawga Lake with American technical assistance, in which connection the advice of the FAO regional officers was invited, and the construction of the fish ponds was started in April, 1953. It is stated that in view of the recent formation of the Fisheries Bureau, foreign assistance is earnestly desired to help with this project. A paper entitled " A General Pilot Survey of the Inle Lake " by U Ba Kyaw, was circulated as Occasional Paper 53/2.

Cambodia

There is at present little but subsistence fishing in the marine provinces of Cambodia. There is, however, one of the most flourishing fresh-water fisheries in the world based on the Great Lake and its tributary, the Tonle Sap, involving numerous costly barrages and other large-scale fishing devices as well as in the river Mekhong. This fishery, based on the periodic inundations of vast tracts of land surrounding the lake, sustains a large fish drying co-operative and a fermented fish sauce industry, in regard to which there is abundant literature in existence (see paper, " Situation de l'Industrie du Poisson Sec au Cambodge," presented at this Meeting). The National Fisheries Service is at present concerned over the possible interruption of the great fish migrations through the cutting back of the forests and the " brush-pile " method of fishing (see paper "Apercu General sur la Migration et la Reproduction des Poissons d'Eau Douce du Cambodge" presented at this Meeting).

The production of fish in Cambodia is estimated to have been 156,800 tons in 1951**.

Ceylon

Ceylon has a fishing population estimated to exceed 100,000. Marine fisheries, which account for the bulk of the catch, are at present concentrated very near to the coasts and engage some 12,000 simple craft and numerous beach seines.

The catch is estimated to have been of the order of 43,000 metric tons in 1950, 37,000 tons*** in 1951 and 34,000 tons in 1952****. Two 44-foot fishing boats have been received from British Columbia shipyards under Canadian aid through the " Colombo Plan ", a steel-hulled deep-sea trawler is being re-fitted in the United Kingdom and a cold storage plant and other facilities are to be supplied as well as a chief engineer for the " Raglan Castle ". It is estimated that the cold storage plant will be in operation by the middle of 1954. Further extensive aid is planned. The Fisheries Department arranged for the aerial survey of a number of harbours during 1952 in order to study the silting up of channels and with a view to the construction of jetties for these vessels. A fish auction room has been constructed at Passaiyur.

FAO technical assistance is also being provided in the mechanization of smaller fishing craft, under the guidance of Mr. Alan Glanville and Mr. E. R. Kvaran, while a Marine Biologist, an Economist and two Fish Harbour Specialists are under recruitment.

Ceylon is said to have imported about 42,000 tons of fish products in 1951, with a value of nearly 54,000,000 rupees, consisting principally of dried salted fish from India and Pakistan, the Aden Protectorate and the Maldive Republic. There is a large import of fish manure from Pakistan, while canned products from various sources accounted for 2,250 tons. Exports of fisheries products were negligible, consisting mainly of shells.

A Co-operative Fish Sales Union was formed to provide marketing facilities for Co-operative Fishing Societies, of which there were 108 registered at the end of 1952. No new Government loans were made during the year.

* Communication from the Government of Burma.
** Source, Fisheries Division, FAO.
*** FAO Yearbook of Fisheries Statistics.
**** Estimate of round fresh weight from Government Administration Report.

Chanos is captured in large quantities by local fishermen on the Maunar Coast and rearing experiments are being carried on. Freshwater fish projects are also in existence for rearing *Trichogaster* and *Tilapia*, which has now bred profusely. Gourami has also been widely distributed.

The fish marketing activities, which had hitherto been carried out on commercial lines, were handed over to a Co-operative Organization, viz., The Ceylon Co-operative Fish Sales Union, Ltd. The idea of an organization to deal with fish marketing on modern lines was sponsored both by this department and the Co-operative Department in 1951, and the entire scheme was handed over to the Union on October 24, 1952.

China

No recent information is available regarding fish landings on the China mainland, but this was estimated to have been of the order of 2,500,000 to 3,000,000* tons in 1948 and 1949.

In Taiwan (Formosa), fishing is also an important industry. The Joint Commission on Rural Reconstruction has supported a modest programme of assistance to the industry, directed primarily to inshore fishing (with due regard to conservation methods), fish farming, training and construction and rehabilitation of fish harbours and anchorages, while the U.S. FOA assistance has been concentrated on deep-sea fisheries. Both organizations work in close harmony with the Taiwan Fisheries Bureau and the Taiwan Fishery Production Bureau.

The Fisheries Rehabilitation Administration was first established by the United Nations Relief and Rehabilitation Administration in 1946 for the purpose of rehabilitating China's post-war fisheries and handling the distribution of fishing supplies and equipment.

The first relief fishing vessels were received by the Administration in the summer of 1946. They were all purse seiners, which had been purchased by UNRRA from the west coast of the United States. On account of scarcity of surface fish along the China coast these purse seiners were converted into otter trawlers operating in the vicinity of Chusan Archipelago.

In the summer of 1947 a second lot of trawlers converted from purse seiners arrived from the United States. These were specially ordered by UNRRA and were of larger size. They have an over-all length of 87′-6″ each, 92 tons net and 130 tons gross, of steel hull construction.

In 1949 part of the larger vessels were evacuat from Shanghai to Taiwan and the operations of t Administration have since been confined to only small area in the waters north of Formosa and t Formosa Strait. As a result of the great dep strong currents and unfavourable climatic conditio fishing methods and gear have been modifi Small trawls of 500 mesh were experimented w and adapted to the operations in 1949 winter. the following winter all trawls of 600 mesh w abandoned and other improvements have b made in order to meet local conditions, includi the lengthening of the " cod end ".

As a result, there has been a steady increase fish production since the termination of Wo War II, the 1952 catch of 121,600 tons hav passed the pre-war high in 1940**. Coastal fisher are by far the most important category, compris about 60% of the total landings. The build of small powered vessels is being encouraged replace the numerous light country craft. F net treating plants have been constructed, opera by the local fishermen's associations. Funds h been provided for the rehabilitation of two making plants at Makung and Hsinkang altho the total production of 20 tons a day is proving sufficient to meet the demand at the height of fishing season. Under the 1953 programme, Chunan Fishermen's Association will be assis in putting up cold storage machinery, and porta refrigerators have been supplied to 28 communit Training schemes include adaptation of fisher to powered vessels and a series of short train courses have been given on the operation of di engines.

Production from fish culture has increased fr 5,242 tons in 1945 to 29,580 tons in 1952. chief problem of fish culture in Taiwan is the sup of fish fry. Since the fry of the three princi species of Chinese carp has ceased to be availa the programme envisages the substitution of c mon carp, and four carp hatcheries have been est lished. Chanos is an important food fish accounts for about 60% of the total pond fish p duction. The JCRR has given technical and fin cial assistance for experimentation on pond fer zation in milkfish ponds by the Taiwan Fishe Research Institute.

Tilapia mossambica was introduced to Tai from Malaya in 1944, and has become widely tured under a large-scale extension program which includes its cultivation in ricefields (see "

* FAO estimate.
** Source, J.C.R.R.

ılture of Tilapia in Rice Paddies in Taiwan", ailable at this Meeting).

As regards seaweeds, the rehabilitation of the ds has resulted in the production of some 15,000 . from the Pescadores in 1952 as compared with pre-war figure of 40,000 kg.

rench Territories

There is no information on the fishing industry French Territories in Asia.

ıdia

The registered fish landings for India were, in)52, 497,280 tons as against 551,561* tons in)51 (these figures do not include Kathiawar). his reduction is largely due to the failure of the rdine and mackerel fisheries along the Malabar oast. This figure does not, however, include esh-water subsistence fishing which may well ing the actual total up to the 1,000,000 tons mark.

Some 5,200 tons of fisheries products were im-)rted in the year 1950/51 consisting largely of ıred wet-salted and dried fish from the Arabian oast and Pakistan. Imports of canned fish were egligible. Exports are listed at 19,659 tons for ıe same period, an increase of over 3,000 tons on ıe previous year, consisting mostly of dried, dried-lted and wet-salted fish to Burma and Ceylon.

During the year under review, efforts to increase roduction of both marine and fresh-water fish were ntinued. In this connection the following easures were adopted.

The Central Government granted financial assist-ıce amounting to about Rs. 3,223,000 to different tates for implementing 40 Grow More Food chemes for fisheries development. These schemes ere directed towards increased production by ndertaking (a) directly productive schemes, (b) chemes for powered fishing in the seas and (c))r increasing the availability of fish. The schemes ere mostly continued from the previous year and ıe estimated additional production will be about 5,000 tons.

Development of inland fisheries continued in ıost States by increasing the area under fish culture. his has required surveys of cultivable waters, clamation of derelict tanks and beels and stocking ıem with fry and fingerlings of suitable varieties f food fishes. About 2 lakh acres of inland waters ere surveyed during the year and more than 450 ıkhs of fry and fingerlings were collected and tilised for stocking purposes. The Central Government assisted in providing assorted varieties of fish seed from Calcutta to the deficit States and also obtained special concessions and facilities for the transport of fish on the Indian railways.

Steps were taken by the State Governments to increase the number of fishermen's co-operative societies and to liberalise the supplies of yarn, timber, sail cloth, fishing hooks and other requirements during the year. These organizations have been particularly active in the States of Saurashtra, Bombay, Travancore-Cochin, Madras, Orissa and West Bengal.

Research programmes taken up at the two Central Fisheries Research Stations and Sub-Stations and also by the research units of the various Fisheries Departments of the States were continued.

Long-range schemes were also continued for development of both marine and inland fisheries. Two Dutch Cutters and two Reekie Boats of the Central Deep Sea Fishing Station continued to carry out exploratory fishing off the Bombay and Saurashtra Coasts. A private Japanese fishing vessel worked successfully during the year and landed 1230 tons of fish in 26 voyages from 27 November, 1951 to 11 December, 1952. Two Danish Cutters of the West Bengal State continued to conduct exploratory fishing in the Bay of Bengal. Their operations indicate the richness of fishing grounds at the head of the Bay of Bengal specially in regions off the mouth of the Mahanadi river.

In Bombay State there has been an increasing demand for marine diesel engines for fitting in the local fishing craft operating in in-shore waters, there being 70 such powered craft in operation. In Madras, 11 small powered craft were fitted with marine diesel engines.

Steps taken to improve the quality of cured fish were continued in the maritime states of Bombay, Travancore-Cochin, Saurashtra and Madras.

An Indo-U.S. Operational Agreement signed early in the year, provides for an expenditure of $2,462,000 and Rs. 6,895,000. Under this Agreement preliminary steps were taken to procure equipment for the mechanisation of 144 small country craft, introduction of 14 mechanised multi-purpose boats, two vessels for mother-ship operations, two purse-seiners for off-shore fishing, three trawlers for deep sea fishing, a dredger for clearance of small fishing harbours, establishment of nine ice factories and cold storage plants and 11 insulated road-vans for storage and transport of fish.

* Source, Govt. of India.

The Government of India's cold storage plant in Bombay was completed by the end of 1951 and started freezing operations from March, 1952. During the year 1952, this plant has handled 968 tons of chilled fish, 92½ tons (for 9 months) of frozen fish, and 202 tons (for 7 months) of frozen meat and has sold 2,803½ tons of ice. Two ice-cum-freezing plants of the Madras State are nearing completion at Mangalore and Kozikode. The Bombay State gave assistance to fishermen's co-operative societies for erecting ice plants. Further facilities for quick transport of fish by means of fish carrier launches and road-vans were provided by the Bombay and Madras States, respectively.

Navigational test tank equipment has been installed at the Central Water and Power Research Station, Poona.

The services of the following experts were obtained from abroad through the F.A.O. and F.O.A. : One Industrial Consultant to advise on the working of the Government of India Deep Sea Fishing Station, one Fishery Consultant to advise on the working of the F.O.A. Assistance Programme, one Inland Fisheries Specialist and one Fishery Engineer for West Bengal. Steps were taken also to obtain the services of a Harbour Specialist, a Naval Architect, a Fish Culturist and a Fishery Engineer.

Training for fisheries administrators continued at the inland fisheries research station, Barrackpore, and eight state-sponsored officers and private candidates completed the course during the year. Training in fishing methods from powered vessels was imparted to eight men on the vessels of the deep sea fishing station and 17 men on the Japanese vessel Taiyo Maru No. 17. Twenty-six fishermen of Bombay State received training as mechanical drivers and navigators. Four officers of the State Fishery Departments were deputed to Indonesia to attend the fish culture seminar conducted by F.A.O., five officers were deputed to receive fishery statistical training at Bangkok under the Technical Assistance Programme, and one officer was deputed to U.K. under the Colombo plan. Fisheries schools organised for the benefit of the small children of fishermen continued to function successfully in the Madras and Bombay States.

Indonesia

Indonesia's tuna fisheries are in an early developmental stage. Very little tuna is taken at present, but pre-war Japanese fishing operations indicated that there were substantial stocks in several areas of the archipelago. Present tuna catches consist primarily of skipjack, with small amounts of yell fin. Fishermen operate from March to Decem using hook and line with live bait. The catcl landed fresh, sold at wholesale public auction, generally distributed smoked.

The total fish landings in Indonesia in 1 were recorded as 420,000 tons.* Imports fisheries products were 53,600* tons in 1951, c sisting mainly of cured fish from Singapore (14,00 and Thailand (16,000 t.) while canned sardines f the U.S. (9,700 t.) and Japan (8,000 t.) accour for the bulk of the remainder. Exports v 21,200 tons for the same period, consisting lar of crustacean and mollusc offal.

Sea fisheries in Indonesia are said to sup about 320,000 fishermen or about one mil persons. The catch in 1952 amounted to 365 tons of fish to the value of 1,666 million rupi The development of sea fisheries is not mere technical problem of increasing the fish pro tion; long term socio-economic factors play important role. The Government Sea Fishe Service is concerned with both these aspects. technical part is based on the results of pre research ; the efficiency and the production of sea fishery can be increased rapidly only thr modernization and mechanization, and in c to increase the production capacity of the exis sailing boats, it is necessary to use carriers in c to transport the fish from boats to the fish ma Additional measures are : the establishmen stations and workshops in important fishing cen the erection of ice plants and cold storage inst tions, and, eventually, canneries.

The development of the sea-fishery must pr a better living for the fishermen and their fam The Government believes that the fishermen have an opportunity to modernize their own in try and they must not become labourers of bi dustries, and that this can only be done if the fi men organize themselves in cooperatives, w must have Government credit facilities.

Early in 1952 through the intermediary o U.S. technical aid programme, 60 motorized *m* boats purchased from Japan were sent to fi men's organizations in various fishing centres some *mayang* boats were also built in the cou A number of hulls built by the Sea Fisheries vice have been equipped with engines from ab Fifteen bonito boats made in Japan of 20 tons were also sent to East Indonesia and two tuna pers of 50 tons each have arrived from Fiji five experts from Fiji have come to Indone

* Source, FAO Yearbook of Fisheries statistics.

in workers in their operation. Two refrigerated h carriers have been purchased from the Nether-nds which, it is hoped, will arrive in Indonesia the course of 1953.

Since the sea fisheries cannot at present supply e amount of fish needed, fish farming is of great nportance. Fish farming includes brackish-water sh culture covering an area of 112,450 hectares, sh culture in 14,000 hectares of fresh-water ponds, sh culture in 270,000 hectares of rice fields, fishing about 9 million hectares of lakes and marshes, nd fishing in rivers. The Bureau for Inland Fish-ies aims to improve existing methods, to pro-ote the use of improved hatcheries and selected ngerlings, distribution of better species of fish, diffuse information on the lay-out and main-nance of fish ponds, release of fish into swamps nd lakes, to supply improved fishing gear, to con-uct courses for extension workers and for fish rmers, to promote through demonstrations the se of organic manure in ponds.

The repair of 338 kilometres of ditches has resul-d in the improvement of 15,760 hectares of fish onds. 5,100 breeding fish have been distributed, nd 6,737,500 fingerlings have been released into vamps, lakes and fish ponds, covering an area of 7,000 hectares, resulting in a total production in-rease of 12%.

The following technical assistance has been eceived :

A sea fisheries specialist, 2 engineers and 3 assist-nt engineers from Fiji (experts in tuna fishing) to ain Indonesian fishermen in tuna fishing and in ne operating of refrigerated tuna clippers, supplied y the U.S. programme. The Government has equested the Organization for two experts on rimp fisheries.

apan

Many problems of the Japanese domestic fisheries, hich are essentially of the temperate zone, are omewhat foreign to those of the Indo-Pacific egion as originally defined by the Council. Never-heless, the benefit of the store of fisheries know-edge which is available to the most outstanding shing country in the world, cannot but be of great enefit to the Council, especially as regards the igh seas tuna fisheries and the general adminis-rative approach to the problems.

Perhaps the most striking single aspect of Japanese fe is the large amount of fish consumed by all asses of the population ; in fact, discounting the fact that fish is in itself one of the most complete foods, it might even be said that there is an imbalance of diet in reverse proportion to that of other Asian countries, since according to the Japanese Fisheries Agency 78% of the animal protein consumed by the urban population (including milk and eggs) is derived from fish, while in rural districts this figure may be as high as 87%.

Japan has 2,044 fishing villages along 13,845 miles of coastline (including islands), with some 1,500,000 fisherfolk which with their families represent 6% of the total population. These people and their operations have been the special concern of the Government in its rehabilitation and reorganization programmes.

The recovery of the fishing industry since the cessation of World War II has been rapid, production having increased from 2,260,850 short tons in 1945 to about 3,800,000* metric tons in 1951 (other large producers were, the U.S. 2,345,000 tons, Norway 1,820,000 tons, China and the U.S.S.R. with unknown quantities in the neighbourhood of two million tons each and India with a possible 1,000,000 tons). The number of fishing boats increased from 297,723 in 1946 to 480,340 in 1950.

The herring group accounted for 852,500 tons, and molluscs 876,800 tons, tuna and other mackerel-like species 338,400 tons, the perciformes 230,000 tons and the gadoids 211,000 tons.

Exports in 1951 were 78,260 tons* of which frozen tuna shipped to the U.S. accounted for nearly 20,000 tons, while canned products accounted for another 22,500 tons. As might be supposed, imports were negligible.

There has been a considerable increase in recent years in shellfish culture in inshore waters.

One of the features of Japanese Fisheries Administration is the complete network of fisheries radio stations, on which a paper has been received for the present Meeting. A further paper has been submitted on fisheries education in Japan, as well as numerous descriptive and method papers on the different phases of the industries themselves.

The food fish taken in fresh waters are eel (*Anguilla japonica*) ayu or samlet (*Plecoglossus altivelis*), pond smelt (*Hypomesus olidus*) dace, and the common and crucian carps (raised in rice fields), while salmon ascend the northern rivers. Rainbow and brook trout were transplanted from the U.S. in the early 1900's, grass carp was imported from China in the 1940's. The best production from freshwaters in recent years was 102,000 tons in 1942, this figure

* Source, FAO Yearbook of Fisheries Statistics.

having dropped in 1949 to below 42,000 tons. The output of fish from rice fields was 1,946 tons in that year, from 158,500 acres, the present production being less than 1,000 tons from 226,000 acres.

The chief government administrative institution is, since 1948, the Japanese Fisheries Agency, although the Prefectures have their own programmes, often including numerous experimental stations and large research vessels.

The high seas tuna fleet, including mother-ship operations, now numbers many hundreds of large, well-equipped vessels ; the salmon expedition operating in the North Pacific exceeded the target set of 1,500,000 fish for the 1952 season. Japanese whalers have resumed fishing in the North Pacific. with an uncompleted target of 5.5 whales per day. Antarctic whaling remains steady at about 131,000 tons per year.

Korea

The Council has little information on the fisheries of Korea. Statistics for South Korea show that fish production has declined to about one third of the pre-war figure and in 1951 stood at about 277,000 tons. Landings in North Korea were reported in 1938 to have been 1,326,000 tons.

Laos

The fisheries of Laos are exclusively in the river Mekhong and other freshwaters. Little is known in regard to the landings, which are of a subsistence nature. There has been little attempt to encourage fish culture practices which would undoubtedly contribute to better nutritional standards. The Government has recently assigned a member of the staff of the Ministry of Agriculture to make preliminary investigations in this respect and it is announced that the Royal Laos Government will for the first time be represented by an Observer at this Meeting of the Council.

Maldives Republic

The Maldive Islands in 1953 became a Republic under the protection of the United Kingdom Government which is responsible for the Republic's international relations. The territory was previously administered by the Sultanate with foreign relations through Ceylon. Although fishing is an important industry and a thriving export trade in "Maldive Fish"—a specially prepared hard, durable product with a consistency somewhat similar to the smoked bonito sticks of Japan—the Council has little information on the fisheries. Exports to Ceylon in 1951 were 2,151 tons of Mal Fish (about half the pre-war figure) and 387 t of other types of cured fish.

Netherlands Territories (Netherlands New Guinea)

The fishing industry in Western New Guine for the major part still on a subsistence level. N the major coastal towns—Hollandia, Manokaw Sorong, Fakfak, and Merauke—a limited amo of fresh fish is sold to European and Chinese habitants.

The fishing methods employed by the na peoples are primitive, although fairly well adap to local circumstances. Since the establishm of a Fisheries Service by the Government a consi able amount of cotton fishline, netting, hooks other implements is being imported and distribu to the local fishermen, resulting in an increas use of these materials. Statistics of the fish p duction are not yet available but there are ind tions of increased catch and consumption.

No signs of a lack of protein in the diet of people are found, except in the interior, wh fishing is sporadic. Extensive water areas for culture are however available for future deve ment.

It is believed that there is an abundance of ner pelagic fish, especially of *Rastrelliger* and *Sardi* and also oceanic stocks of tuna and related spe

A steel experimental tuna boat of 90 gross for tuna long lining and live bait fishing in equat waters became available in the latter part of 1 A trawl cutter of 80 gross tons for experim fishing on the Sahul Shelf between New Gu and the coast of Australia is under constructio Holland and was to be available in June, 1 Both ships will be operated by local crews u the command of Dutch fishery captains with tro experience.

Improvement of fishing methods and more p cularly the methods of fish preservation by sa and smoking, is the concern of the Departme Sea Fisheries.

With a view to the improvement of the di the rural population, an investigation is being m into the cause of the low supply of fish and considered important to increase the fresh-v fish population. Trials made with the pla of carps in the Wissel lakes in 1940 failed an planting of *Trichogaster* in the Ajamaru lakes rather unsuccessful.

hkistan

The registered statistics of fish landings are given 77,000 tons* of which roughly half corresponds East and West Pakistan, respectively. It is ident, however, that this figure ignores subsis- nce fisheries, which may account for as much as 00,000 tons, it having been estimated that 50,000 ns of freshwater species alone are caught annually East Bengal.

The fisheries of West Pakistan engage a large umber of the traditional vessels, the design of hich is being studied by FAO naval architects. Iuch mechanization has taken place, while two sheries research vessels are being constructed in ie U.K. The industry of East Pakistan is still rgely dependent on small country craft which are ot suitable for fishing out of sight of land, and are ardly mechanized at all.

Production and distribution are greatly handi- apped by the lack of berthing accommodation and rganized marketing facilities, which makes for apid deterioration of the catch and low prices for ie fishermen. An FAO team has at the request of ie Government designed a new fish harbour and iarket for Karachi. In East Pakistan, the absence f organized distribution is much more evident nd an FAO team has made its recommendations or the establishment of collection points and water- orne carriers. The situation in East Bengal suffered serious deterioration subsequent to the cutting ff of its largest natural market, Calcutta. There no doubt that the vast network of inland water- ays of the Pakistan Sundarbans could well form ie basis for a thriving fishing industry, in addition which there are considerable possibilities of in- nsive culture operations in over 8,000,000 hec- res of lacustrine waters and rice fields.

One modern fishmeal plant of 10 tons capacity er 24 hours has been installed at Karachi. A joint ompany with American and Pakistani Capital has een formed to freeze and export shrimps from arachi to foreign countries. The building for e installation of the plant is under way, the plant as been shipped and it is expected that the work ill start by February, 1954.

There is need of basic research on the biology both the marine and freshwater stocks in order facilitate Government appraisal of its future velopment policy.

Exports of fish products for 1951 were: West kistan (principally cured fish) 21,800 tons, East Pakistan 10,300 tons* (principally fresh fish to West Bengal, India), while there was a large export of 6,500 tons of fish fertilizer principally to Ceylon and the U.K.

The Government of Pakistan has taken an active part in the Council's Hilsa Sub-Committee, which has proposed an international research project for investigations on the biology of this species. Several papers have been presented at this Meeting by the Government of Pakistan.

Philippines

From 1946 through 1951, the catch statistics showed an overall increase in the total production of fresh fish with some apparent recession between 1948 and 1950. A year after the cessation of World War II, production started with 49,600 metric tons in 1946 reaching a maximum of 296,100* metric tons in 1951. The recession between 1948 and 1950 was attributed mainly to the intensive government campaign against illegal fishing methods, while the inland fisheries were likewise being depleted due to over-fishing.

There has been a consistent increase in the total number of commercial fishing craft from 358 units in 1946 to 1,148 in 1951. The increase in number of powered craft was more preponderant than in non-powered craft. In 1946 there were 215 powered and 143 non-powered craft but in 1951 the former increased to 792 and the latter to 356 units. The successful introduction of the American Otter Trawl in 1946-47 and the use of improved trawling winches in the trawl fishery; and the adoption of cooler refrigeration in the fish holds are outstanding developments in the mechanization of marine fisheries.

This mechanization of craft and gear has involved a reduction in the number of commercial fishermen in the insular fisheries from 12,318 in 1949 to 9,463 in 1951.

The coastal trawl fishery ranks first among the principal marine fisheries of the Philippines with an aggregate catch of about 26,345 metric tons. This fishery developed from a modest beginning in 1900 employing sailing sampans until the 1930's when an over-all mechanization of both the craft and gear occurred. World War II brought considerable damage to the entire fishing industry, but immediately after liberation in 1945, the industry has steadily increased to its present level.

* FAO Yearbook of Fisheries Statistics.

Since 1949 there has been an increasingly evident over-expansion of the trawling fleet in operation. With very limited coastal trawling grounds, estimated at about 4,500 sq. miles, some areas are being over-fished and signs of depletion are noticeable.

Expansion beyond the existing 40 fathom-line of commercial operation has proved unprofitable on account of the absence of commercial marketable species at this depth and any large-scale expansion of the fishery would be by the use of larger trawlers in the oceanic grounds along the south and southeast coast of China and Hong Kong.

Regulation of the coastal fisheries is under serious study by the Philippine Bureau of Fisheries. The trawl fishery depends upon 30 families of fishes represented by about 98 tropical species most of which are percomorphs.

The reef fishery ranks second to the trawl fishery with a total landing of about 7,140 metric tons in 1950. At the outbreak of World War II there were 16 (muro-ami) fishing vessels in the Philippines but during the post-war period it has decreased to 2 in 1951. The fishery is apparently reviving on account of the intensive campaign being waged by the government against the use of explosives and fish poisons. The fishery depends upon 20 families consisting of 55 species. Of these, five species of *Caesios* contributed more than 50 per cent of the total catch.

In the pelagic-neritic fisheries, the anchovies, chub mackerels, clupeoids, and the carangoids are considered the commercially important groups. In 1950 the combined landings from these three fisheries amounted to about 32% of the total catch.

Anchovies rank first among the pelagic neritic fisheries contributing about 12.5% of the total production of the insular fisheries (1950). The production from this fishery has steadily increased from 409 to about 9,001 metric tons.

The chub mackerel (*Rastrelliger*) ranks next to the anchovies in commercial importance, contributing about 7.4% of the total landing of the insular fisheries in 1950. The catch has fluctuated from 3,928 to 3,516 metric tons in 1950, and soared to an all-time height of about 8, 501 metric tons in 1951. There seems to be no apparent depletion of the fishery; the fluctuation may be attributed to its relative availability for the fishermen due to unknown biological factors.

Clupeoids (herrings and sardines) are next in importance to the chub mackerels, contributing about 6.7% of the landings from the insular fisheries in 1950. The landings started to decline from 8,242 metric tons in 1947 to an all-time low of a 3,176 metric tons in 1950. A slight increas landings in 1951 occurred brought about by opening of new grounds in Northern Palawan depleting the Visayan Sea sardine grounds. Du this period there was almost a wholesale tran of the sardine fishing fleet (bag netters and ro haul seiners) from the Visayan Sea to nort and northeastern Palawan. Three comme species of *Sardinella* support this fishery. Only species of freshwater herring, *Harengula tawil* Lake Taal is taken in commercial quantities. late, this lake fishery seems to be showing sign decline due to over-fishing activity with the of powerful mantle and electric lamps.

The Carangoids (crevalles, cavallas and sc are included in this group, contributing a 5.4% of the landings of the insular marine fish in 1950. The landings had declined from 4 metric tons in 1947 to 2,641 metric tons in 1 However, in the latter part of 1951, a relati new carangoid group, the round scads, entered fishery. In 1951 alone, 4,644 metric tons landed by the bag net and round haul seiners, than the combined landings of crevalles and cav in the same year. Commercial fishermen have r lately that the round scads are replacing the clup and chub mackerels in the pelagic-neritic fish

The tunas and bonitos are the least exploit the pelagic-neritic fisheries and are well belo potential output, having contributed less tha per cent of the total landings of the insular fis in 1950. Since the cessation of the operati the two Taiwanese long-line vessels in the part of 1951, the catch has declined to 297 m tons. Any industrial development of this fi will depend upon the yellowfin and striped and would require large investment for the struction of vessels and processing plants.

The line and trap fishery contributes less one per cent but has prospects if developed extensive scale. Snappers and groupers a commercial species contributing to the fi Before the war the Japanese organized small f dinghies attached to a mother vessel using m handlines operating at depths up to 80 fathor

The depletion of the fishery for *Teuthis* to over-fishing during the last ten years is re serious consideration.

The fishery for lantern fishes (myctoph a comparatively recent development. Beca the relatively high protein and ash content its utilization as a source of fish meal for the growing livestock industry has great possi

In the fish pond fishery, the use of mechanical hovels, bull-dozers and centrifugal pumps in the eclamation and construction of ponds has been uccessfully adopted. Small gasoline inboard ngines have been extensively used to propel the ge-old dugout crafts.

Of the three sources of fish produced in the Philippines, the bañgos (*Chanos chanos*) fish pond ishery has steadily developed in extent by a con-inuous increase in acreage under cultivation. The ireas under cultivation started with about 52,000 iectares in 1946, reaching about 85,000 hectares n 1951. An additional area of about 15,000 hectares vas expected to be developed in 1952, thereby naking a total of about 100,000 hectares under cultivation during the 1953 season. Cultivation of Tilapia, Gouramy and Carp is also being inten-sified. Substantial financial assistance is being provided to fish farmers and demonstration ponds are being constructed, while there is a programme for stocking natural waters and rice fields with Tilapia and Carp.

The stability of the fish pond industry compared with that of the sea fishery and the effective financing program of the Philippine Government through the Rehabilitation Finance Corporation have contributed to the development of this industry during the last two years. About 400,000 hectares of potential brackish-water areas capable of large production are still available in the Philippines. The production from the fish ponds has continuously increased from 22,379 metric tons in 1946 to 38,570 metric tons in 1951, an increase of about 72%.

Projected development of the fish ponds under the U.S. Technical Aid Programme includes the establishment of fish nurseries, demonstration farms and a systematic fish stocking programme of inland natural waters.

The bañgos (*Chanos*) fish fry industry is the most important of the municipal fisheries. Normal production is sufficient to stock about 161,000 hectares. This supply will be ample for the requirements of the next three or five years assuming the rapid development of the inland fisheries and the fish pond industry. This fishery presents no picture of depletion and new fry grounds are being opened and developed in many coastal areas of the Philippines.

The Philippines imported 46,318 tons of fish products in 1951, an increase of 61% over the previous year. The main item was canned sardines from the United States. Exports were negligible.

Portuguese Territories

Little is known of the fisheries of Portuguese territories in the Region except that these constitute an important activity in Macau and Timor, the principal methods used in the first-named being sailing junks and a large, special type of lift net.

Thailand

Second only to rice, fish is the most important item in the Thai diet and it is the only complete protein food that can be produced in large enough volume and cheaply enough to reach the mass of population; nevertheless, although the Gulf of Thailand is one of the most productive marine areas in Southeast Asia, it is not being utilized efficiently or sufficiently.

In 1951 the sea fisheries showed a decline as compared with 1950. The fish sold in the Bangkok Wholesale Fish Market was composed of 40,800 tons of fresh fish and 27,300 tons of salted fish in 1950, and 23,000 tons of fresh fish and 22,700 tons of salted fish in 1951.

The Government has given loans amounting to 4,000,000 bahts to the fishermen to recondition traps damaged by typhoons.

In 1952, the number of fish fry and fingerlings distributed to the people throughout the Kingdom by the Fisheries Department was 830,000 as compared with 167,000 and 691,000 in 1950 and 1951 respectively.

To meet the demand of fish-pond owners in Bangkok and in the other provinces, Chinese carp fry have been imported from Hong Kong.

The sum of 114,000 bahts was appropriated in 1951 and 66,900 bahts in 1952 for the promotion of pond culture in Bangkok and Dhonburi. There were 305 fish ponds totalling 162,000 sq. metres in 1951, and 545 fish ponds totalling 661,500 sq. metres in 1952. About 29,400 fish fry in 1951 and 256,500 fish fry were stocked in 1952. Towards the end of 1952, there was a great demand for Tilapia for pond culture, some 307,000 fish having been distributed.

The average annual catch of freshwater fish is about 50,000 tons, worth about 25,000,000 bahts.

One of the principal sources of freshwater fish is the leased areas where fish are, shortly after the rainy season, assembled and grown to market size. They are also exploited from various rivers and swamps by means of stationary and moveable gears.

The conditions of inland fishing grounds in Thailand are, at present, badly deteriorated. The yield of fish from those grounds has, as a result, diminished from year to year. A scheme for developing the inland fishing grounds is therefore required.

Large numbers of *Chanos* (milkfish) fry and fingerlings have been collected from Prachuab and

Chanthaburi Provinces and investigations of local fry grounds have been continued through 1952. An experimental station has been under construction at Prachuab. Other prominent brackish-water animals suitable for culturing are the area shell (*Arca*), sea mussels (*Mytilus*), oysters and shrimps which all grow plentifully.

In 1951 and 1952 the sum of 61,200 bahts and 153,290 bahts respectively, were appropriated for the establishment of a marine station at Rayong. It was expected to start work in 1953.

Fisheries officers of the Department of Fisheries together with U.S. personnel conducted a preliminary survey of the Gulf of Thailand. Experiments on the operation of the Japanese Muro-Ami net were carried out at Prachuab, with satisfactory results.

The study of the fishing gears operated in the inner gulf and around the eastern coast was proceeded with. Various fisheries equipment such as gill net, otter trawl net, Danish seine, Muro-Ami, fathom meter, electric generator, fishing boat and marine demi-diesel engines were received under the U.S. Technical Assistance Programme. The shark and shrimp resources are also to be assayed with FOA assistance. FOA is also assisting Thailand, through its fisheries officer, Mr. M. J. Lobell, in the experimental operation of different types of indigenous and Japanese gear and simple trawl nets, fish handling and processing, and other investigations.

Thailand has been authorized to spend US$12,000 for the purchase of fishing gear in the U.S. and possessions.

Pla-thu (Rastrelliger) is the economic fish of Thailand because of its abundance in Thai waters. It is, therefore, the common daily food of the poor and the only low price animal protein food. The amount of catch of this fish is estimated at not less than 50,000 tons per annum. At present the fishery is badly depleted owing to over-fishing and uncontrolled exploitation.

The Thai Government Bangkok Wholesale Fish Market commenced operation in April, 1953 and construction of a large cold storage has commenced.

In 1951, Dr. S. W. Ling was assigned by FAO to the Thai Fisheries Department. Dr. Ling has advised and assisted in (1) the introduction of many practical fish cultural techniques; (2) developing the four inland fisheries stations; (3) offering practical technical training to Thai fisheries technicians; (4) organizing and conducting Fish Culture Training Courses for Thai fisheries offic (5) development of fish culture in paddy fie irrigation tanks and swamps. Financial assista has also been received from FOA in connect with these projects.

FAO fellowships were awarded to four T fisheries officers who participated in the fish cul training centres in Indonesia.

In 1950, one expert in the field of marine fishe and fishing craft, and two refrigeration engine were provided by the American Aid Program to assist in initiating a marine fisheries program make a survey and plan the construction of a re geration and ice plant.

Five FOA fellowships have been awarded fisheries officers for one year's training in the U in fisheries technology and refrigeration, fishe biology, fisheries management and co-operative

Some 20,900 tons of cured fish was expo from Thailand in 1951* principally to Indone while imports were registered as 3,300 tons.

United Kingdom Territories

Brunei. There was a marked increase in the nu ber of registered fishing craft, from 224 in 1 to 692 in 1951. Appreciable progress has b made towards increasing the supply of fish prawns and reducing the time which elapses tween capture and consumption, with the enthus tic co-operation of the fishermen. Governm loans have been granted for the purchase of board engines, larger and more seaworthy c and other equipment, and co-operative socie have been encouraged. It is considered premat to suggest any further changes in the traditio fishing methods.

Federation of Malaya and Singapore. Des a series of emergency situations during the p war years the fisheries of the Federation of Mal and Singapore had, by 1949, been rehabilitate the point that the production of 126,000 tons above the pre-war average of 85,000 tons, there was a further increase to 144,700 tons 1950. This recovery was the more remark since 45% of Singapore's fish was in pre-war y produced by a Japanese fleet and there were c siderable imports of cured fish from Indone Thailand and Burma, the availability of which reduced after the war. The coastal fisheries Singapore are mainly exploited by fishing sta

There was, however, a decline in landings in 1 and 1952 to 138,000 tons in each year, whic

* Source, FAO Yearbook of Fisheries Statistics.

tributed partly to security operations and partly the infestation during 1951 of many species of sh by the post-larval stage of a platyhelminth worm, hich made the fish unacceptable to the buyers, hile 1952 was a bad fishing year, particularly on ie North-West Coast. In 1942 the total popu-tion was 4¾ million and in 1952 it was 6½ million eople.

The total number of powered fishing craft rose om 588 in 1949 to 1,822 in 1952 and 2,422 in une, 1953, while the number of unpowered craft ropped from 22,954 to 17,025 in the same period. he total number of fishermen fell from 72,000 1 1947 to 65,000 in 1952, showing an increased atch per unit of effort.

Mechanization has been achieved with the assist-nce of the Fisheries Department through the tting of outboard engines to native craft which ct as fish carriers and as tugs for country boats. air trawlers have been used on offshore grounds nd diesel craft have been developed for inshore shing and purse-seining. Demonstration of proto-ype craft has been followed up by schemes for nancial assistance to fishermen. In order to keep ace with increasing mechanization, short courses ave been arranged at Penang in boat construction nd engine installation and maintenance. The se of ice in fish carriers at sea is now widespread nd there is a wider distribution of fish inland than eretofore. The Government has now built its wn dockyard at which fishing craft are constructed or those who receive a financial subsidy.

The cultivation of cockles on the foreshore has een developed and encouraged on the west coast ith a consequent reduction in price to the consumer.

In the field of freshwater fisheries, provision for sh cultivation has been made wherever new land as been brought under irrigation control for rice ltivation. There has been a widespread increase fish culture among the Malay peasant and more an 1,800 fish cultivators have commenced reap-g a harvest 1952, in many cases with Government nancial assistance. A new form of Chinese fish rm has been developed, in conjunction with the ising of pigs, fruit and vegetables and yields have en consistently as high as 5.16 tons of produce r acre, of which fish represents about 2½ tons. is estimated that there are at least 3,000 acres nder direct fish cultivation and some 450,000 acres f irrigated rice land producing fish as a cash crop. xperiments with the introduction of Tilapia to ice fields have been unsuccessful owing to competition from *Ophicephalus* and other predaceous fishes and the experiments have been discontinued.

Although the Malayan fisherman gets perhaps a higher price than his counterpart in neighbouring countries, there is still an urgent need for greater efficiency in methods and especially in transportation and marketing facilities. Statistical analysis shows that the price of fish is closely correlated with the price of rubber in Singapore.

The Director of the Regional Fisheries Research Station for South-east Asia arrived in Singapore in June, 1952 and is planning the building of his laboratory, research craft and the purchase of equipment. The Commonwealth Fish-culture Research Station has been delayed for a number of reasons, including the availability of water supplies.

The Department of Fisheries now possesses seven mechanised vessels, varying from a 26-foot inboard diesel-engined inshore craft to a 107-ton seiner-trawler. It has also three inspection launches. Experiments were carried out in Singapore on the preservation of fishing nets.

Imports of fish products to Malaya and Singapore increased from 40,500 tons in 1949 to 58,300 tons in 1950 and 98,700 tons in 1951*. As has been stated above, however, imports of cured fish consumed by the indigenous population had dropped from a pre-war figure of 52,600 tons to 11,600 tons in 1949 and the 1952 figure of 41,500 tons (from Thailand, Japan, Indonesia and Indochina) is still below previous imports. The total import figure is largely composed of canned fish (some of which is re-exported) from the United States, the United Kingdom, South Africa and other countries and of fish for use as fertilizer from Indonesia. Exportations accounted for 47,300 tons, including 32,662 tons of cured products, mainly to Indonesia, which represents in part re-exports through Singapore's entrepot trade.

A programme of fundamental research has been pursued on the factors affecting the distribution of fish resources in space and time and the social and economic conditions in the fishing industry.

Hong Kong. Practically the only fisheries resources are the seas around the Colony up to 100 miles. There is a small amount of pond culture but this is insignificant.

The total quantity of fresh fish sold during 1951 was 22,138 tons** with a wholesale value of HK$30,424,549 and dried and salted fish 8,016 tons valued at HK$8,687,688. The fishing population

* Source, FAO Yearbook of Fisheries Statistics.
** Source, Government report to FAO

was estimated in 1951 at 52,800, while the fishing fleet was composed of 776 large trawlers, 150 long liners, 1,700 purse seiners, 1,500 hand liners and miscellaneous bringing the total up to 5,315.

A large mechanical drier has been installed in the Co-operatives and Marketing Department with a capacity for 2 tons of fish at one time. This drier now operates on a commercial scale and is understood to be the first of its kind in the tropics.

Excellent facilities are provided by the Government Wholesale Fish Marketing Organization, including transport by a fleet of launches and trucks. There are two large wholesale markets, one in Victoria and one in Kowloon. The Organization's commission is 6% covering all services from the time of landing to the time it reaches the retail market. The Organization provides low interest credit facilities to fishermen from a revolving fund of HK$250,000, from which loans amounting to HK$973,500 have been made.

The Fisheries Division is carrying out a survey of fishing grounds and types of fish caught on them, surveys of oyster beds, pond fishing and the possibility of fish farming on rice land.

Imports to Hong Kong rose to 36,850* tons in 1951 as against 24,900 tons in 1950 and about 7,000 tons pre-war. This included fresh fish and shellfish from China and Macau, canned fish from the U.S. and Canada, cured cuttlefish, (squid) from Japan and 3,280 tons of seaweeds.

Exports (mostly re-exports) were 22,900 tons, including re-exports of canned fish and shellfish to Malaya, cuttlefish to Malaya and Thailand and 4,075 tons of sea-weeds.

The Hong Kong Government continues its policy of encouraging mechanization of local fishing craft, loans having been made for this purpose by the Department of Marketing and Co-operatives and through a HK$800,000 five-year loan from the British Colonial Development and Welfare Fund, administered by the Director of Agriculture, Forestry and Fisheries. Considerable credit assistance has also been given by commercial firms. There are at present 232 mechanized vessels in the Colony, of which 87 were installed during 1953.

A training course for skippers who have mechanized their vessels under the above schemes was commenced in December, 1952 and has had considerable success, there now being a long waiting list of trainees. A further course for the training of mechanics is being organized.

North Borneo. Fish landings in Sandakan du 1952 averaged approximately 75.3 tons mont Landings in Jesselton were about half this quan In 1953 the average daily sales in the Sanda market have risen to 2.8 tons.

Three small Hongkong trawlers, which v brought into the Colony by a private company 1951, ceased to operate in March, 1952.

At Tawau the fish supply exceeds the local mand, and at the beginning of 1953 a fish p capable of storing 30 tons of fresh fish was insta by a local fishing company. The average mon shipment of frozen fish to Singapore from Ta is 51.71 piculs valued at $1,990.

The Fresh Water Fish Culture scheme is ceeding satisfactorily. More than 60 ponds been completed, of which the majority are alre stocked.

Trichogaster has been experimentally introdu to rice fields. *Tilapia mossambica* has succ fully spawned in the Sandakan nursery pond.

Sarawak. Fish is the staple food of a large of the population of the Colony, mostly from ma sources and it was possible to export a small sur in 1951. A recent survey indicates that there no concentrations of fish which would justify la scale operations. There is, however, scope some mechanization of local methods.

Conditions are generally suitable for freshw fish farming and some Chinese farmers obtain and economic yields. However, since most o fry have to be imported from the China main experiments are in hand with Tilapia (which be bred successfully in Sarawak) to determine best to manage this type of fresh-water fish.

United States Territories

Hawaii. Commercial fish landings during year 1950-51 totalled 8,650 metric tons, value nearly US$4,000,000 to the fishermen. This resented a 29% increase in tonnage over the pre year. A poor tuna run in 1952, however, red the 1952 tuna figure by 27%, although incre landings of other species resulted in a net redu of only 10%.

The Pacific Oceanic Fishery Investigations continued with three major lines of research cluding the ecology, distribution and abun of tuna in equatorial waters, the study of the

* Source, FAO Yearbook of Fisheries Statistics.

ck fishery in island waters and artificial bait studies. nteresting conclusions have been reached regard- ng the upwelling of nutrient-rich waters owing the convergence of the equatorial currents in ne Pacific, although the role played by fronts in ne region of convergence and the associated dis- ribution of zooplankton and tuna has still to be larified.

American Samoa. There are no organized sheries in American Samoa, fishing being on a ubsistence basis.

Guam. Fishing on the island is confined almost xclusively to areas within the reef and production s inadequate to supply local demand. The total stimated catch for the year 1950-51 was 220 metric ons.

Ryukyu Islands. The paramount problem con- ronting the Ryukuan fishing industry is the neces- ity to engage in deep-sea fishing around the archi- elago and the adjacent seas. Prior to World War II fishing was carried out by Japanese fisher- nen operating out of their home islands. Fish nigrate northwards passing Borneo and the Philip- ines, enter the Ryukyu waters and are exploited y Japan-based vessels of 60 tons and larger. Ryukuan fishermen have traditionally limited their perations to the narrow coastal belt and these grounds are limited by the steep dropping away of ottom and the existance of coral, which prevents rawling, and moreover greater concentration in hese waters would not result in greater catches. n 1950, 65 fishing vessels were built and a number f ice plants were constructed and a refrigerated vare house with capacity to quick-freeze and store p to 1,000 tons of fish was put into operation at Naha on Okinawa in 1952. However, since the ocal people are not traditionally fishermen, leader- hip is lacking to build up and guide an industry which offers the greatest hope for the future in slands where the resources are few and meagre.

Viet Nam

There is little statistical information available o the Council in regard to fish landings in Viet Nam ince this country became an autonomous kingdom within the French Union, the present emergency ituation precluding their collection on a country-wide scale for the time being, although it is known that there are numerous fishing communities all along the coast of the South China Sea and the Gulf of Tonkin.

The Ministry of Public Works is presently charged with the administration of the marine fisheries, while the Ministry of Agriculture is responsible for the freshwater fisheries. There is a fairly close co-operation between the two ministries in matters relating to these industries.

Six wooden Japanese trawlers have been provided by the U.S. Special Technical and Economic Mission to Indochina and these are lying at points in North, Central and South Viet Nam. There is a project whereby the fishermen's co-operatives would be enabled to acquire those boats, after an initial trial period. The same agency has provided two large purse seiners based on Saigon but there is little information as to their programme of work. Fisheries patrol boats have also been provided. Fisheries biological investigations are being carried out by the Institut Oceanographique de Nha Trang under the direction of Monsieur R. Serene, the present Chairman of the Council.

Fresh fish (principally *Pangasius*) is imported from Cambodia in Junks with live-holds, which have a water circulation excepting during the short marine journey between the mouths of the Mekhong and the Saigon River. These are usually imported at a length of about 20 cm and are raised in ponds to marketable size in about 6 months with night soil fertilization. Experimental ponds for the study of this fish and the usefulness of other species for culture in ponds and rice fields have been constructed at Hanoi and a further station is being planned near Saigon. A Vietnamese trainee was recently present at the Fish Culture Course for Thai Officers, by courtesy of the Royal Thai Government through arrangement with the IPFC and financial assistance from FOA, and a small quantity of Tilapia has been introduced. It is still too early for any conclusions to be drawn.

The Council was able to arrange for Dr. S. W. Ling, FAO Fisheries Expert assigned to Thailand, to visit Viet Nam in October, 1953 to give advice on these projects.

REPORT OF TECHNICAL COMMITTEE I TO THE 5th MEETING

INTRODUCTION

According to its Rules of Procedure, the Indo-Pacific Fisheries Council has two Technical Committees. Technical Committee I has the responsibility of studying the biological and oceanographical problems of the region which may be referred to it by the Council. This Committee has been functioning since 1949, and it is therefore desirable in this report to review its accomplishments to date, draw attention to any defects in the present method of operation, and suggest if possible remedial measures for the future.

A general review is therefore given of the accomplishments of Technical Committee I, but it can be seen that most of the work to date has been at the fact-finding level. There has been very little effective digestion of these data or the formulation of research plans by this Commitee and it is proposed to discuss in this introduction the manner in which this very important function of this Committee can be realized.

With such broad and diversified fisheries as exist in the Indo-Pacific region, the tendency has been for Technical Committee I to appoint specialist Sub-Committees whenever a new field of enquiry was referred to it. At the 4th Meeting in Quezon City, ten such Sub-Committees were appointed. In order that these should be functional and representative of the views of Member Governments, it was felt necessary to invite nominations to each of these Sub-Committees from each member country. Whilst in practice it has been found that not all Member Governments make nominations, a total of 76 persons was nominated to these Sub-Committees at the 4th Meeting. With limited active scientific personnel in the region, this total has only been made up by nominating either non-scientists or already overworked scientists, often to the key position of chairman or rapporteur. Sometimes, indeed, the nominee of a particular government is not active in the Sub-Committee's special line of enquiry.

In order, therefore, to make these Sub-Committees more effective, it is suggested that their number be reduced, and also that a very careful selection of nominees, and particularly that of chairman or rapporteur, be made when such Sub-Committees are being constituted at the 5th Meeting. In this regard the reduction in the numbers of Sub-Committees proposed by the Secretary merits consideration by all members of the Council.

It should be axiomatic that a person nomin by a particular government should be perm and encouraged by his government to under duties in connection with the work of his Sub-C mittee. This has not always been the case, how and Member Governments should be asked nominate only such persons to Sub-Commi as may be in a position to undertake I.P. duties, either directly or through their subordin

The various Sub-Committees are the tech extensions of the Technical Committee during period between Council meetings. It is impera therefore, that they function as such. Due to distances involved, it is rarely the case that mem can meet between Council Sessions, and the of these Sub-Committees is therefore carried by correspondence. This method of opera is admirable during the fact finding life of the Committee. When the stage is reached for formulation of problems and the developme research plans to solve them, Sub-Commi may be confronted with language and other culties when functioning by means of corres dence, and the need is then apparent for the w experience of the full Technical Committee at stage. Unfortunately, many members of Sub-Committees never have the opportunitie attending Council meetings or meeting mem of the Technical Committee. In so far as function seems limited in the period between m ings and that they are generally inoperative at C cil meetings, one might question the conti existence of such Sub-Committees. If the Adm trative Correspondent in each country, is in touch with the fisheries research of that cou and assisted by a panel of experts for specia advice, then the bulk of the work of these Committees might be handled by the Administr Correspondents. Such a method might, how fail in some cases because the Administrative respondent is considered by some governm to be a channelling and not an initiating agent other cases the tasks assigned might be too for the Administrative Correspondent to h alone.

The suggestion of the Secretary that the Adm trative Correspondent in each country sh periodically convene a meeting of the cou nominees to the various Sub-Committees fo cussion of progress in the completion of their va assignments might be an excellent compro but would not be entirely satisfactory in cou

ving a large area, because of the cost and time volved in travelling.

It appears then that Technical Committee I has self not functioned effectively between meetings ecause :—

(a) The multiplicity of its Sub-Committee as been too big a drain upon the available tech- cal personnel of the region.

(b) The governments of the region have not minated suitable personnel or have failed to sup- rt their nominee in his I.P.F.C. activities.

(c) It is difficult to proceed past the survey age by correspondence alone.

The remedies suggested as partial solutions to ese problems are :—

(a) The reduction in the number of Sub-Com- ittees at meetings and the retention between eetings of those Sub-Committees for which suit- le personnel can be found or to which specific signments can be given.

(b) The full recognition by the governments the regions of their obligation in respect of suit- le nominees and of the valuable part such nominees ay play in the functioning of the Council bet- een meetings.

(c) The sympathetic consideration by govern- ents of the idea of the Administrative Corres- ondent acting as I.P.F.C. liaison officer in matters concern to the Technical Committees.

(d) The eventual appointment of technical aff to the Council's Secretariat, whose duties uld in part consist of supervising the work of e various Sub-Committees.

I. INLAND FISHERIES

Fish Culture

The Rapporteur of the Fish Culture Sub-Com- ittee, Mr. H. R. Montalban of the Bureau of isheries, Republic of the Philippines, has main- ined contact with the members of his study group roughout the year.

.1 *Weed Control*

Copies of the paper by Dr. K. F. Vaas of Indo- esia entitled " Notes on the Water Hyacinth in ndonesia " are now available for distribution to e new Committee as Contributed Publication o. 8. Also available at this Meeting are : " A ibliography of Weed Investigations " and " Im- roving Duck Marshes by Weed Control " con- ining numerous references to literature on the ubject, supplied by the U.S. Government in res- onse to the Council's request at its 4th Meeting ee Annexure I on pp. 96-7).

1.2 *Pollution of Natural Waters*

Information was requested of Governments by the Secretariat in accordance with the directive contained in Resolution 24.3(13). From the reports received, it appears that the problem of water pollution is common to the Indo-Pacific Region, especially in those countries with extensive industrialization programmes. Although the harm done to the fisheries may be such as to have a serious effect on food supplies, this problem has received little attention in the region and it is recommended that Member Governments give serious consideration to this factor and that the recommendations of their fisheries experts be taken into account in the planning of their over-all programmes.

It is common knowledge that perennial water resources have historically attracted human population and that modern industrialization requires adequate water supplies. It is consequently inevitable that streams have to be used not only for the drawing of water but also for the disposal of drainage from cities and of waste products from industry. The effect of these waste products on the fish life has in some cases reached such a proportion as to have completely destroyed the fish resources and it is therefore important from the point of view of the conservation of food that every effort be made to mitigate these harmful effects as far as possible. Polluting factors in city and factory discharges have been classified into (i) oxygen-depleting ; (ii) toxic and (iii) inert, choking substances. Available remedial measures are ; (i) diversion to obtain greater dilution; (ii) lagooning and impoundment of wastes ; (iii) neutralization; (iv) coagulation ; (v) removal of solids ; (vi) utilization of waste as commercial by-products ; (vii) control of location of factories.

" Current Science " (1938) and Fowler (1939) have elaborated on certain aspects of these pollutional hazards, pleading for the establishment by Governments of a central Water Pollution Research Board for the investigation of the physical, chemical and bacteriological impurities and to introduce improved sanitary arrangements. Unfortunately, only those aspects which primarily concern public health were mentioned by them, without reference to the impact of these wastes on aquatic life. Bhaskaran (1947) struck a warning note that many new industries would come into existence in India and the disposal of wastes, which hitherto was not of much consequence, would now have to be studied.

India

Some State Public Health Departments and Municipal Authorities have conducted surveys of

streams in their respective jurisdictions, collected some information on the coliform bacteria count, the biochemical oxygen demand, the total organic and inorganic solids, odour, and other factors. A notable example is Modak's report (1928) on the sewage disposal of Bombay.

Seth and Bhaskaran (1950) conducted a survey of a 40-mile stretch of the Hooghly river in and around Calcutta to study the effects of disposal of industrial wastes on the sanitary conditions of the river water, which shows that the wastes from the paper industry constitute the major source of organic pollution, but considering the great volume of water available in the river, the discharge of wastes from these industries has not materially affected the sanitary condition in the river.

The chemical wastes from the pulp section in large quantities are toxic to acquatic life even in small doses which might be generally considered insignificant from the standards set for public health.

Similarly in the leather tannery industries, the wastes from the ' finishing ' section contain sodium hypochlorite, sulphuric acid and dyes, which have a direct toxic effect on fish and aquatic life. It should, therefore, be of interest to conduct toxicity experiments with test fishes using these obviously deleterious wastes.

Hora (1942) placed before the Fish Committee of the Indian (then the Imperial) Council of Agricultural Research a short note on the pollution of streams in India and its likely effects on fishes. The Council, after due consideration of the matter, recommended to Provincial Governments the introduction of suitable legislation to prohibit industrial concerns from discharging into rivers, effluents harmful to fish. Further, the Council suggested that domestic sewage properly treated might prove a useful source of food for fish.

Sewage utilisation for fish culture has indeed been considered as one of the well-known methods for sewage disposal, vide Modak (1938) on sewage disposal in Bombay. Bose (1944), in giving a brief history of the Calcutta drainage system, stated that, ordinarily, crude Calcutta sewage which was harmless to fish was being used in fish culture near the now defunct Bidyadhari river. Nair (1944), however, found that even during the monsoon months, when the Calcutta sewage was diluted to 9 times of its volume with water, the fish fauna of the Kulti river was affected for a distance of 5 miles above and below the outfall, possibly due to the putrefaction and septic nature of the effluents. Once the organic sewage was allowed to settle and putrefy, the easily oxidisable substances will have a high demand for oxygen, and the oxygen bud of the water is depleted to a level below which life cannot survive. Fowler (1944) stressed point and recommended the discharge of the sew into a stream in an entirely fresh condition, so if there was sufficient amount of water with dissolved oxygen present in it, there could be danger to fish and other life. Experiments by (1944), with fingerlings of carps (*Labeo ro Catla catla*, *C. mrigala*) and gold fish, showed the Calcutta sewage had no deleterious effect fishes until it became septic and deficient in oxy concentration. But once the sludge settled d and began to putrefy, only those fishes with ac sory respiratory organs like *Anabas*, *Ophicephe Ophichthys* and *Pseudapocryptes* were able to in it.

Industrial wastes like those of sugar facto milk canneries etc., may be predominantly org in composition and have effects similar to thos domestic sewage. They may again be partly org and partly inorganic in composition as those paper and pulp mills, textiles, leather tann etc. On the other hand the metal-plating, m part manufacturing and chemical factories, wells and refineries, coal mines, etc., pro wastes that are highly toxic to aquatic life. Ma (1943), reported destruction of quantities of f in the river Leh in Rawalpindi immediately flooding as the result of a very local storm. H Khan, who investigated the matter, atrributed heavy mortality of the fish to the effluents the Attock Oil Company's refinery which sh on analysis the presence of excess of toxic stances like iron, free acid, kerosin oil and impurities.

Hora and Nair (1944) conducted a detailed su of the Rungbee Kola and the Riyang, tribut of the Teesta river, to study the impact of ha effluents of the quinine factory at Mungpo aquatic life. Observations made in all seaso the year showed that the fish fauna was aff only during the dry months of March and when the bed of the rivers is blanketed in with a dark flocculent matter. The che waste products contained in the effluents a low concentration, and it was shown experime that in concentrations of 1 to 100 or even 1 t the test fishes could live almost indefinitely pro the wastes were kept fully agitated, a conditi eminently characteristic of torrential streams the other hand the streams are affected by th position of dark residues in the form of a fine culent matter constituting a thin blanket o bed of the streams and by the oil contain the effluent. These conditions (blanketing

l-film formation), however, do not last long and e removed when the rains swell the streams and ake them habitable for fish. As the effect of the fluent was negligible and felt only for a hundred rds or so along one bank it was concluded that shes in the Teesta river were presumably not fected. It was, however, recommended that dark sidues be removed and a few additional gallons oil recovered by constructing a few more settling nks for the effluents.

The Research Assistant, Madras Fisheries Depart-ent, Mettur, who visited the Government Quinine actory at Naduvattam in the Nilgiris, reported at the effluents of the factory which were drained irectly into the perennial Moyar river contained nly 0.5% of caustic soda and were not injurious fish life at any time of the year. Even half a er cent means 500 parts in 100,000 which, accord-g to the recent British Public Health Act, for ischarge of liquids containing suspended matter sewers (45 parts in 100,000, Fowler—1944) is far excess of the legal limits.

Bhimachar and David (1946) who studied the ffect of effluents from paper mills and Iron works t Bhadravati on the Bhadra river fisheries, observed hat there was definitely deleterious effect on the shes in the affected area for a distance of at least miles below the points of discharge, the strongest ffect being felt from September to May. With he commencement of the monsoon rains, however he effect felt was negligible.*

Ganapati and Alikunhi (1950) studied the effects f the effluents of the chemical factory at Mettur n the fisheries of the river Cauvery near Mettur Dam. The Mettur Chemicals Ltd. manufacture austic soda, bleaching powder etc., and the ffluents containing highly toxic substances are ischarged into the Ellis surplus channel which, vhile receiving surplus flood water from the reser-oir during the high flood period from July to October, remains practically dry during the rest f the year. So long as there was a regular and ontinuous flow of water through the Ellis regulator, he fishes were unaffected by the toxic substances free chlorine, chloride, caustic lime and soluble nd insoluble solids) present in the wastes. Once he flow in the channel ceases, eleven pools are ormed in a series in the bed of the channel, the first ive of which receive the direct discharge of the ffluents resulting in the total mortality of all fish ife over a distance of at least half a mile along the hannel covering four of the five pools. Biota were, however, not altogether absent in the polluted pool even under extreme summer conditions. Laboratory experiments showed that test fishes could live in a dilution of 1:999 and above. It was, therefore, suggested that the effluent drain should be directed to the main river to a spot close to the tail-race of the Mettur Power House where even the lowest rate of flow would ensure a minimum dilution of the effluent to over 5,000 times.

Ganapati and Chacko (1951) studied the effects of wastes of the paper and pulp mills on the Godavari river near Rajahmundry and found that the fishes in the river remained unaffected during the period of floods. Only during the non-flow season (January to June) when the river becomes lentic in condition, do the effluents cause any harm to the fish population over a distance of one mile below the outfall. Laboratory experiments with test fishes showed that they could survive in the effluent water diluted to 500 times and the authors have accordingly suggested purification of the effluents by rapid filtration through sand before being discharged into the river.

The recovery of the chemicals and other materials from the wastes of the quinine factory at Mangpoo, and the Chemical Factories at Mettur Dam, is generally uneconomical, as the recoverable materials are available in large quantities at cheap rates. The effluents may be rendered innocuous either by excessive dilution or by providing a series of settling tanks to regulate the flow into a river system. There are certain industrial wastes like sulphate liquor from pulp mills, white water from paper mills, wastes from sugar mills, oil, chemicals etc., which can be profitably utilised. Paper and pulp mills have usually a soda recovery plant, which recovers caustic soda and other chemicals used in the digesting process of the raw materials.

Seth and Bhaskaran 1952(i) and 1952(ii) have studied the problem of utilization of wastes from lac and film industries. The wastes from lac industries proved to be rich sources of nitrogenous matter, comparable to the best oil cake in its fertilising property and could be utilised (i) in recovery of gas (ii) as a manure and (iii) as a biological filter.

In the film industries, the solid wastes, which consist of film-scrap or rolls of old films, are a rich source of cellulose which can be treated with weak alkali and used in the manufacture of bangles and toys, or for giving extra gloss and water-proofing

* From a private communication from the authors as their contribution was still in the form of an abstract in he Proc. Ind. Science Congress, 1946.

quality to leather. The liquid wastes from the developing department of the film industry are rich in silver which can be recovered by chemical precipitation.

In 1945 the Fish Committee of the Indian (then Imperial) Council of Agricultural Research, New Delhi, recommended a scheme for the study of stream pollution, which the Council could not finance for want of funds. The problem was subsequently referred to the Central Inland Fisheries Research Station, Barrackpore, Calcutta, in May, 1949 with a directive to gather definite data in regard to (i) location of main centres of pollution (ii) factors responsible for pollution and (iii) the ill-effects of such pollutants in the fishery of the area. A work programme to study stream pollution in the river Sone near Dehri was subsequently prepared according to which surveys were to be conducted of the affected area at five periods of the year.

Life in streams may be affected directly or indirectly in one or more ways. The industrial wastes may (i) decrease oxygen content of the water to a point below which life cannot be sustained, or they may (ii) destroy fishes and other animals by increasing the acidity, alkalinity and salt contents of the water or by introducing toxic substances, or (iii) by increased turbidity, reduce available light and thus prevent growth of plant food, or (iv) they may deposit a sludge-blanket on the bottom of the stream so as to destroy the organisms found there which serve as food for fish.

River Sone, one of the main tributaries of the river Ganga and flowing southwest to northeast for a distance of 325 miles, rises from the Central Indian Plateau which is fed by monsoon rain, meeting the Ganga near Ratna. Rohtas Industries (paper and pulp factory, chemical factory, sulphuric acid factory, sugar factory, cement factory etc.) are located on the left bank of the river near Dehri-on-Sone in Bihar.

In the preliminary survey, a series of observation points were selected above and below the anicut and work on the following lines has been conducted :

(a) River flow calculation at points in the clear water channel. Stream flow measurements are used for calculating dilution ratios, oxygen resources etc. Average effluent flow is also determined.

(b) Determination of dissolved oxygen, biochemical oxygen demand (B.O.D.) pH, alkalinity, acidity and turbidity of samples of water collected at all the observation points.

(c) Bottom samples for biotal collect zoo- and phyto-plankton at all the observation po with a view to evaluating the biological impac pollution. Stream bottoms are normally the ha of numerous aquatic insect larvae and other ani and plants which are the principal food of fis Bottom samples taken below and above the sou of pollution show immediately the approxi quantity and the type of fish-food organisms pre If sufficient quantities of these animals are present in the bottom to feed upon, fish soon appear from the area, whether or not the w there is pure.

(d) Chemical analysis of the effluent wate

(e) Laboratory experiments using test f to study the toxicity of these effluents. In the where these physiological experiments are ducted, *Barilius*, *Aspidopawa*, *Chela* and *B* spp. are used as test fishes. Dilutions of the eff waters in these experiments are made only clear river water collected from above the I anicut. Individual factory effluents have also collected for toxicity experiments.

(f) Collection of fishes from various under observation : Fishes collected above below the pollution points are examined for par infestation. The stomach contents are also amined, analysed and correlated with the pre of fish food organisms in various zones.

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donesia

Different types of pollution have been under ervation in Indonesia during the last twenty irs. The chief offenders have been sugar mills, ioca and rosella factories, and sulphur rks. As a result of a report by the Director of e Sugar Research Station at Pasuran, legislation s enacted in East Java to prevent pollution of e lower courses of rivers during high tides when e brackish-water fish culture ponds (tambaks) e being replenished.

As regards the waste from rosella factories, periments were carried out at the Laboory for Inland Fisheries at Bogor involving the ution of the noxious matter; the progressively aker dilutions were then aerated and the beviour of fish kept therein observed.

When a solution of 5% of waste matter was ed, the fish showed distress after 5 hours and minutes; in a 10% solution after 5 hours and minutes, and with a 20% solution, after 3 hours d 45 minutes; and with a 50% solution after 2 urs. In the undiluted waste the fish would die after only 45 minutes. It was, however, concluded that the rosella waste was not itself toxic and that the decrease in oxygen level was the principal cause of mortality, which could be remedied by aeration.

Examination of the waste products from tapioca factories showed that this contained fibres and flour in suspension and sugar, proteins, hydroprussic acid and acetone-containing glucosides in solution. Again the remedy lies in adequate dilution, when the glucosides rapidly disintegrate into acetone, glucose and again hydroprussic acid. The latter substance is very volatile and a good deal of it will escape into the air, although it is lethal to fishes at 0.78 parts per million and 50 mg. is the fatal human dose. It was found that some grades of tapioca were more noxious than others.

Philippines

An act was passed in 1952 making it unlawful to discharge specified substances harmful to fish life or place them where they can pass into the natural waters of the Philippines. Violations of this provision have been sporadic and when they occur investigations are made to determine the source of pollution and the extent of the damage caused, and to recommend remedial measures.

Offenders are sugar mills and their distilleries, usually located on the banks of rivers, and their waste products often affect the Chanos fishponds below the point of discharge. Other violators are breweries, tanneries, mining concerns, sawmills, vegetable oil and soap factories.

In the case of a brewery which had caused damage of this nature, the following measures were recommended and carried out; sedimentation prior to discharge, whether or not accompanied by precipitation; removal, by filtering or pressing, of solids some of which it has been found possible to utilize, the remainder being incinerated.

In the case of a sugar refinery, irrigation canals were constructed so that the effluents might fertilize the soil and the excess has been diverted into a large river, thus minimizing the effects by dilution. In another refinery, the noxious effluent was impounded in a mangrove swamp area especially acquired for the purpose.

In a few cases, it was discovered that the complaints were unfounded, but much more remains to be done to carry on this work, for which insufficient funds are available.

Pakistan

The sources of water pollution in Punjab are a city's sewage, effluents from an oil company and

discharge from a brewery, which cause the mortality of a large number of fish during the dry period of March and April and first advent of rains when the Ieh River gets flooded. Measures taken in preventing pollution are the purification of all sewage, diversion of outflow of this sewage through a tunnel to avoid its fermentation, and calling the attention of the brewery and of the oil company to the need to control or prevent pollution.

In Karachi, no problem in water pollution has been reported, and in East Bengal no investigation has been undertaken.

Burma

No investigations have been conducted to determine the nature and effect on fish stocks of the pollution of natural waters.

Cambodia

Only two instances of pollution of natural waters have been encountered up to the present, according to this country's report which recommends a thorough study of the problem.

1.3 *Fish associations and optimum densities*

Information has been forthcoming from a number of Member Governments in regard to these studies, as recommended in Resolution 24.3(14) passed at the 4th Meeting, with a view to increasing fish production in ponds through the introduction of compatible species and age-groups at the optimum density rate for each.

China

The practice is a well known feature of Chinese pond culture. The fishes used include the different species of carps in addition to the bream, the grey mullet and the milkfish. Varied combinations of species and age groups have been tried with great success and at present this practice is widely used. There are modifications undertaken to suit the types of ponds to be stocked and developed in the different regions in this country. Technical paper No. 1, "A Chinese System of Pond Stocking", by Dr. S. Y. Lin is presented at this Meeting.

Malaya and Thailand

In these two countries species combination as used in China is also practised. The difference lies in the use of less stock and a smaller number of species. This may be explained by the fact that the supply of seed fish in these countries is quite limited and as a matter of fact much of the supply is still imported from China.

India

In this country the various species of carps cultured in association with each other and milkfish, pearl-spot and gourami. As in Ch the differences in feeding habits is the b principle in this multiple stocking. The pra is widespread and has attained various state development in different areas.

Cambodia

The fishes cultured in Cambodia include Pa sius, the Siluroids, the Clariids, the Ciprinids, Ophicephalus. The Ciprinids are associated Clariids, and Siluroids and Clariids with Op phalus. The density varies with the methods

Philippines

Fish associations and optimum densities of patible combinations of different age-group stocking operations have not been investigate a definite line of research in fish culture in country. This aspect is incidentally being w out along with other problems as in the ca milkfish (*Chanos chanos*) and jumbo tiger sh (*Penaeus monodon*) which are raised togeth brackish-water fishponds in view of their differ habits of feeding. Although both live on same kinds of natural food (algal and plank materials), Chanos has been observed to feed along the surface, whereas *Penaeus* is a b feeder. Penaeus fry are collected for the pu of stocking but their number in relation to of Chanos has not been definitely deter so far. Further research in connection wit particular problem and along other lines is planned by the Bureau of Fisheries, an results of such studies will be transmitted t Council in due course.

Pakistan

The practice of fish culture in association sidering the different species involved and opt densities of compatible combinations of di age-groups for stocking operations is repor being done mainly in two places in Pakistan, n Punjab and East Bengal.

In Punjab, three species of carps, catla *catla*), rohu (*Labeo rohita*), and mrigal (*C mrigala*) are cultivated with carnivorous s and goldfish (*Carassius auratus*) and som with mahseer (*Barbus tor*). For best results 3,000 fry of these combined species are s per acre to afford maximum production of

3,100 pounds per acre per year. Overstocking ıses large mortality and it is safe to stock less in w and still unbalanced ponds. Less number is ed per unit area when yearlings or adults are cked.

In East Bengal fish cultivation of mixed species well developed. The same species as are used Punjab with the addition of kalbouse (*Labeo basu*) are cultured. The condition of the water termines the percentage of the different species be introduced in a particular body of water.

Proposed International Fish Fry Exchange

The opinion has been crystallized out of the uncil's discussions on resources of fish stocking terial in the Indo-Pacific Region that the general id development of fish culture activities in the gion might be greatly enhanced by the establishnt of a centralized distribution service to facilitate procurement of this material, which includes gs, fry and fingerlings, by Member Governments.

The Council has therefore circularized its Mem- Governments to obtain their opinion and alough many of these countries have not yet replied, consensus of those countries which have answered favourable. It appears, however, from the rets to hand that many new sources still remain to surveyed in each country. Each individual coun- except in a few instances seems to be engaged solving its own problems in this respect and may be in a position to supply outside needs. The table exceptions are the carp fry syndicate of ina and also that of India, which appear to be in position to undertake large-scale overseas disution of fry from their local production. The lowing is a summary of the information received m Member Governments :

stralia

No report.

rma

No report to make for the present but inquiry been referred to authorities concerned in this ntry.

ylon

eed fish needs sufficient for the present but re may be potential need for carp fry in the ure.

ina

No report for the present but the carp fry supply m the river systems of the mainland have long ered international trade and the industry is well managed and organized. In Formosa the need for more Chanos fry is acute and a great amount can be absorbed from any country that could supply this need.

India

Local fish seed sources need further survey to effect better inter-state distribution in this country. Organized production of fish stocking material is now being carried out especially for Indian carps and export to other countries may be possible upon demand.

Indonesia

No report.

Japan

No report.

Korea

No report.

Malaya

This country needs to import the carp species that propagate in Chinese river systems and these are easily supplied unless disturbed by unforseen causes. Supply of other required species is sufficient and this country may be in a position to export in the future if demand arises.

Pakistan

No report.

Philippines

Needs for types of culture developed in this country sufficient for the time being but the development of freshwater fish culture will necessitate introduction and importation of exotic species.

Thailand

No report.

The Fish Culture Sub-Committee therefore *recommends* :

(i) That a thorough inventory of the fish fry situation of cultivable species in the Indo-Pacific Region be made along the lines of the accompanying questionnaire (see p. 10) to determine :

(a) Kinds of cultivable species available.

(b) Area from which sources may be obtained.

(c) Areas to be supplied.

(ii) That the working details of a Centralized Distribution Service be formulated by the new Sub-Committee for discussion by the Council.

1.5 *Area of Cultivable Waters*

It has not been possible for the Bureau of Flood Control of the United Nations Economic Commission for Asia and the Far East to assist in the compilation of a table of the cultivable water areas of the Indo-Pacific Region, in accordance Resolution 52/24.3(18), since this informati not available to the Commission.

The following information was received Member Governments :

Water Areas (In Hectares) Available For Fish Culture

		Netherlands New Guinea	Philippines	Viet
1.	Total Area of Country	40,000,000	29,741,290	32,8
2.	Area of Fresh-water Fish Ponds		50	
3.	Area of Brackish-water Fish Ponds		85,000	
4.	Natural Lakes	82,130	230,000	
5.	Artificial Lakes, Reservoirs, Tanks, Canals, Etc.			
6.	Salt or Mangrove Marshes Suitable for Fish Culture.. ..		500,000	
7.	Lagoons and Estuarine Waters Suitable for Fish Culture ..			
8.	Rice Fields—Without Fish Culture			4,9
9.	Rice Fields—With Fish Culture			
10.	Total Available Inland Waters	82,130	416,000	
11.	Area of Arable Land	10,000		3,2

In South Korea, of the total arable land area of 1,954,144 hectares, 1,226,400 were under rice cultivation, of which 535,000 hectares are subject to controlled irrigation.

In Burma, there are reported to be some 510,000 hectares of rice fields under controlled irrigation.

The above information should be added to that contained in the table published on p. 40 of the Proceedings of the 4th Meeting.

2. Hilsa Investigations

The Council's Hilsa Sub-Committee, under the chairmanship of Dr. S. L. Hora (India) with Dr. R. Qureshi (Pakistan) as Rapporteur, was most active during the period 1951-52. The group held a special meeting in Calcutta in September, 1952, as a result of which the Council at its 4th Meeting passed Resolutions 24.3(19 and 20), recommending (a) the collection of catch statistics by the Governments of Burma, India and Pakistan and (b) that these Governments consider the formation of a small regional unit for research work on the species, directed towards obtaining an adequate knowledge of the populations and to discuss with FAO the ways in which technical or other assistance might be made available for the staffing and operation of such a unit.

In pursuance of this resolution, it is understood that the Government of India approached the Governments of Pakistan and Burma inviting them to co-operate in the formation of a Hilsa co-operative investigation group. The Government of India proposed that scientific officers of each Government, after formulating their Hilsa problems, meet at Barrackpore (India) and studying the work that is being done there, draw up a d programme of combined research on a r basis. The Government of Burma regrett inability to undertake work on Hilsa eithe regional or a national basis, but have offered nish all available data. It is understood reply is still awaited from the Governm Pakistan. In the meanwhile, the Governm of India is preparing some tentative pr for setting up a research unit, which event of the proposal being acceptable Government of Pakistan, could form the b discussions.

The Chairman conferred with the Secre the Council during the latter's visits to Calcutt the ways and means of making this Inter-G mental Co-operation Research Scheme a Since the next step to be taken now lies w Member Governments concerned, it was f the future work of the Sub-Committee depended on the outcome of these negotiatio ween the Governments concerned.

On the basis of the Sub-Committee's re programme of research on Hilsa in the thre tries has already been formulated and it has g been accepted by the countries concerned next step will, therefore, be the formatio regional unit. In view of the delay enco in the formation of the unit as a co-operat deavour, it is believed that the Council itself now further consider the best means of

ch an international co-operative unit with the -operation of the Governments concerned.

Even though the progress of the Sub-Committee ring the period 1952/54, in so far as the formation the research unit is concerned, has not yet met th success, substantial advances have been hieved in the research programme recommended the Committee through individual efforts.

Mr. T. V. R. Pillay of the Hilsa Fish Enquiry, dian Council of Medical Research, has collected orphometric and meristic data on samples of ilsa from the Hooghly, besides data on the blood aracteristics and general features of the biology the stock and a brief report of his studies has en presented at this Meeting as Technical Paper o. 40.

Twenty-two of the variable morphological charac-rs generally used in racial studies are selected for tailed examination. It is found that the height the body may serve as a distinguishing character. he study of blood characters has resulted in fferentiating 3 blood groups.

The general belief that the Hilsa are too delicate survive the impact of striking the net and rough ndling during tagging and that it is impossible keep them alive after capture has been disproved d it was found possible to keep the fish alive in nall cement cisterns.

A direct relationship between the total weight of e female Hilsa and the number of eggs in the ary has been observed. The view that the annulii the scales do not provide a satisfactory criterion r determination of age or growth has been cor-borated. Studies on seasonal variations in the lative weights of the gonads, the alimentary tract d the somatic tissue and the relative condition ctor have been made. Since this has been taken as a spare-time task by Mr. T. V. R. Pillay, hose present assignment with the Hilsa Enquiry the Indian Council of Medical Research is coming an end, it should be considered how the work ay be best continued.

U Ba Kyaw, Fisheries Officer of Burma, made general exploratory study of the Hilsa fisheries the Mergui District in Burma and a report of is study has been circulated as an Occasional aper of the Council. The paper describes in neral the Hilsa Fisheries of this district. It is dicated that the capture operations are carried in 2 to 5 fathoms near the mouth of the river, d mention has been made of 15 fishing grounds in e area. The fishing is carried on by gill nets and some places seine nets are also used. Some tails of the fishing units have been given and the orking cost of carrier launches has been indicated. Introduction of the mechanized Baby Half-Ring Net of the type of KALANSISI in the Philippines is suggested. However, the immediate problem for Hilsa is a thorough study on the causes of its depletion which has been noticed in this cursory survey.

The Director of Fisheries, East Bengal (Pakistan) informed the Sub-Committee of the report that the Hilsa fish was scarce in the coastal areas of Chittagong during March, 1953, and the belief based on the abundance of the fish around Akyab coast (Burma), that the spawning beds of the fish might have shifted towards the south. He requested that the Sub-Committee should investigate this. In the absence of a research unit, there was little that the Committee could do in this matter. It may be said, however, that during the last 200 or more years, for which topographical records for Bengal are available, there seems to have been a general trend for the Ganges to shift its course eastwards. As the fishery of Hilsa in Bengal is largely dependent on the flooding of the Ganges-Brahmaputra, correspondingly its fishery would also have shifted eastwards. It is likely, therefore, that more suitable ecological conditions have now become established in the Akyab Area of the Chittagong coast.

Three papers have been received by the Sub-Committee in relation to the Hilsa Symposium held in September, 1952, as follows :

1. The Hilsa of the Chilka Lake with notes on the occurrence of Hilsa in Orissa waters, by P. Devasundaram.
2. *Hilsa ilisha* (Ham). on the West Coast of India by C. V. Kulkarni.
3. A note on the Hilsa Fisheries of Uttar Pradesh by K. S. Kaushiva.

These papers along with the papers read at the symposium have been submitted to the Asiatic Society, Calcutta, for publication in their Journal.

Little work has been carried out in Pakistan on the Hilsa problem owing to lack of facilities. Data are, however, being collected and an investigation scheme has been recently sanctioned in East Bengal, while two landing centres on the River Indus in West Pakistan were visited and a number of fishes measured and the conditions of the gonads recorded. These figures will be available for eventual analysis and correlation with similar data from other countries.

3. Milkfish (*Chanos chanos*) Investigations

The Council in the 4th Meeting held in Quezon City, Philippines, in November, 1953, established within its Technical Committee I a Sub-Committee on *Chanos chanos* with Mr. Herminio Rabanal of

the Philippines Bureau of Fisheries as Rapporteur. This action was promoted in order to consider the questions posed in the letter from the Director of the Fisheries Division, FAO, addressed to the Chairman of the Indo-Pacific Fisheries Council. This letter inquires into the state of knowledge in the field of biology and culture of *Chanos chanos* which is undoubtedly of major importance as a cultured food fish in the Indo-Pacific area. The sub-committee considered this task and found that the ten questions posed by the Director of the Fisheries Division are indeed most stimulating and comprehensive along this line of fish-cultural work.

3.1 *Features of the Sub-Committee's Work*

During the 1952 Meeting the sub-committee addressed a reply to the Director of the Fisheries Division which is printed as Appendix 7 in Section 1 of the Proceedings of the said meeting. The main features of the said report may be summarized in the following :

1. That there is very limited knowledge on the biology of Chanos in its natural habitat so that more work on this matter is imperative. The general scheme of the nature of work needed in this regard as suggested by the sub-committee is also incorporated in the said report.
2. Although cultivation techniques in some countries of the region have proved to be quite successful, yet there are several aspects in this field that need further work aimed at possibilities of further improving the industry.
3. That all available information either published or unpublished be placed in the hands of the sub-committee through the Secretariat in order to coordinate the present knowledge on Chanos for possible transmittal to all member countries especially those needing this information in order to develop their potentialities in this field. It is earnestly requested that Member Governments in possession of such information make it available to the Council.

3.2 *New information*

It is gratifying to note that there is rapid accumulation of investigations and there has been an increasing interest in Chanos culture within recent years. Among the most informative of recent publications are Fish Culture in the Brackish-Water Ponds of Java ; Milkfish Culture in Taiwan ; and, the Preparation and Management of Bañgos Fishpond Nursery in the Philippines.

Ceylon

The Sub-Committee received a report from Government of Ceylon that work is being u taken on the biology of *Chanos chanos*, espe its breeding season so that the periods of migr of the fry in estuaries may be known. The r further informs that they have found that i North-Western Sector of Ceylon gravid fe exist during March while fry were found i South-West during July.

India

Research on the biology of Chanos and ex ments on its cultivation are being continued previously mentioned India has embarked on v research investigations on Chanos. A sum of these investigations is being reported Council as Occasional Paper 53/3. The gives the places of distribution and season o rence of the spawners as well as the fry along I waters. Investigations on food, feeding and g completed or those being conducted by v research agencies are discussed. The resu experiments on Chanos culture show very prospects. Research workers of India have extensive work on the acclimatization of C a knowledge which can be taken advantage the intensification of culture of these sp As in other countries of the region knowled the biology of the species in natural waters is m Further investigations being undertaken and undertaken are presented. The paper is a panied by a bibliography.

Indonesia

Mr. Hasanuddin Saanin, Head, Laborato Inland Fisheries, Bogor, Indonesia, has just pleted a preliminary survey of the occurre Chanos fry in Indonesian waters, and the are presented at this Meeting as Technical No. 41, which lists the different localities i country where the Chanos fry fishery is kno exist. The quantity of production in each was also estimated. Valuable data adding knowledge on the biology of the spawners, of spawning and nature of spawning ground been noted. Indicator species as well as pl phenomena which seem related to the occu of Chanos fry proved to be a very interestin of the work although no definite conclusions be made at this time. The paper indicates more thorough survey may yield more lo and greater quantity of catch. The work g far as the rearing of the fry or nursery work the most noteworthy achievement of this are the conclusions and recommendations

e derived, which include : The general insuffi-ency of the total catch of fry due to large acreage d fast expansion of fishpond areas and the high te of mortality ; the need for improved catching ethods and expansion of fry grounds to new calities ; and the importance of adapting improved aring techniques for the seed fry to lessen the gh mortality rate. These recommendations if dopted will encourage the improvement and pansion of the fishpond industry of Indonesia.

hilippines

In the Philippines two papers of importance ere recently released which are contributions to ur present knowledge of the culture methods of hanos. Both of these papers were contributed the symposium on pondfish culture in the Eighth acific Science Congress held in Quezon City, hilippines, from November 16-28, 1953. One of hese papers is " Production Problems of Chanos ulture in the Philippines ". This paper lists the actors that have to do with mortality and loss of sh under culture and also those that are pests or uisances in the fishponds thus increasing the ost of production. In cases where remedies have een initiated, those have also been noted whereas n other cases suggestions for the solution of such roblems are solicited.

The other paper deals on " Nursery Pond Man-gement Techniques in Philippine Chanos Fish-onds " and describes the techniques used in rear-ng and stunting the stock of Chanos which serve s reservoir for multiple stocking of ponds so that ropping can be undertaken from two to four times n a year.

Copies of these two papers are available for con-ultation.

hailand

Investigations on the occurrence of Chanos fry ere undertaken by Mr. Jinda Thiemmedh of the epartment of Fisheries of Thailand, between 1951 953 (See Technical Paper 8).

The occurrence of mature spawners was recorded n the Gulf of Thailand since 1924 and the first y collection was made in Klong Wan, Prachuab rovince in 1950. This locality was used to under-ke studies on the seasonal abundance and occur-ence of Chanos fry in addition to the possible orrelation of tides, rainfall, winds and currents n the presence or absence of Chanos fry. Varied ypes of fishing methods mainly derived from those f the Philippines and Indonesia and their effec-vity in Thailand waters were compared. The quantity of catch obtained during the three years of survey showed the appreciable presence of fry which will supply the needs of the Chanos pond industry to be established in this country.

In Cambodia and Vietnam, and other countries, the Council's work on this species has aroused great interest and there are prospects that fruitful results may be forthcoming in the near future.

3.3 *Plan for Future Work and Recommendations*

(i) The Chanos Sub-Committee wishes to reiterate, through the Council, to all Member Governments who have not as yet submitted their state of knowledge published or unpublished whether on the biology or cultivation techniques of Chanos in their respective countries to furnish the Sub-Committee with all the data needed for the conduct of its work in the future. The Sub-Committee resolves to continue to be the clearing house of new information on Chanos.

(ii) The Sub-Committee recommends that in order to further facilitate the exchange of knowledge on Chanos it be provided with the names and addresses as well as the fields of specific interest of workers devoting full or part of their time to Chanos investigations.

(iii) The Sub-Committee also recommends that topics which recently have attracted great interest in this field be made the subject of a symposium. The suggested subjects may be :

(a) How to increase the productivity of estuarine fishponds.

(b) The problem of fertilization of estuarine fishponds.

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4. Panikkar, N. K., P. R. S. Tampi & R. Viswanathan (1953).—Some aspects of adaptation on *Chanos chanos* (Forskal). Proc. Indian Acad. Sci. 37 : 6. 203-213.

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7. Schuster, W. H. (1952).—A provisional survey of the introduction and transplantation of fish throughout the Indo-Pacific region. IPFC Proc. 3rd meeting S3/1 : 187-196.

8. Soong, Min Kong (1952).—The fitness of ecological niches into which fish are introduced at various ages and the survival of the transplanted fish. IPFC Proc. 3rd meeting, S3/5 : 218-227.

9. Vaas, K. F. (1952).—Notes on and possibilities of fertilization of fishponds in Indonesia. Proc. Nat. Inst. Sci. India 18 : 1 : 1-11.

10. Viswanathan, R. & P. R. S. Tampi (1952).—Oxygen consumption and viability of *Chanos chanos* (Forskal) in relation to size, Proc. Indian Acad. Sci. 36 : 4, 148-159.

II. MARINE FISHERIES

4. Neritic-Pelagic Fisheries

The Indo-Pacific Fisheries Council, at its Fourth Meeting held at Quezon City (Philippines) resolved that in view of the importance of the Pelagic Neritic Fisheries of the region, the work of the Council's Sub-Committee on these groups should continue, with Dr. N. K. Panikkar of the Central Marine Fisheries Research Station, Mandapam Camp P.O., S.Rly., S. India, as Rapporteur, and that efforts should be made to obtain a complete picture of the fish stocks which support these fisheries. The questionnaire which was drawn up to elicit information was circulated by the Secretariat to various member governments. It was further considered that the problem of methodology of investigation of these fisheries should receive close attention and be given special consideration at the Council's Fifth Meeting, when the replies to the questionnaire would be presented in consolidated form. Replies to the questionnaire were received from all member governments except Indonesia, Viet Nam and Korea. The reports received from Japan, India, Cambodia and Malaya are quite informative and the first is presented at this Meeting as Technical Paper No. 12. Out of the reports received, it will be seen that Burma had no information to furnish, U.S.A. has attached little importance to neritic pelagic fisheries and the replies from a few other countries were of a general nature.

A summary report consolidating all the information furnished by Member Governments is given below, although the reports from the four countries listed above may be considered to warrant publication in full.

General. The neritic pelagic fishes of the c tries of the Indo-Pacific area contribute very lar to the total production of sea fishes. The re received would indicate a rough geographical divi of the area based on these fisheries, as follows :

ZONE I.

The composition of the neritic pelagic fish st appears to present somewhat similar feature Pakistan, India, Ceylon, Malaya, Thail Cambodia and the Philippines. Although replies have come from Indonesia and Viet N the published literature on the fisheries and fish fauna of these areas would seem to indicate close similarity of the neritic pelagic fisherie these two countries with the above. Simi although no information is available from Bu geographical considerations strongly suggest possibility of a similar fishery. It is reason likewise to expect that the fisheries of New Gu would present similar features. The neritic pe fish stocks in this group of countries include p cipally the fishes belonging to the Clupeidae, Sc bridae, Sciaenidae, Carangidae and Polynemi The fishes next in importance are species cor under Stromateidae, Chirocentridae, Scom socidae, various percoids and Trichiuridae to r tion only a few of the various families of fi represented. Smaller sharks (Genus *Scolio* and rays are also often caught in the neritic pe zone.

India : The well-known forms are the Sard (the best known being *Sardinella longiceps*, th sardine of Malabar), Mackerel, *Rastrelliger k gurta*, the Ghols (Sciaenids), Bombay Duck, *podon nehereus*, the Seer fish (Spanish Mack *Scomberomorus* spp.,) the Silver Bellies (*Leiogn* spp.), Rawas & Dara (*Polynemus* spp.). Ribbon Fish (*Trichiurus* spp.) and many o smaller fisheries are all of subsidiary importan

Pakistan : The fishery is somewhat simil the above, but the most important are Sciae Sardines and Polynemids—The mackerel does form a fishery as in India and the other coun

Ceylon : Although information is not avai from the reply sent, the fisheries of Ceylon close resemblance to those of India, both the sa and the mackerel playing an important part.

Burma : Information is still not availabl mackerel and sardine, but coastal Hilsa ap to be of some importance.

Malaya : Both *Sardinella* spp. and mack (*Rastrelliger* spp.) are of importance, contrib to regular fisheries.

Thailand: Mackerel (*Rastrelliger* spp.) forms a ry valuable fishery along with Sardines and arangids.

Viet Nam: It is well known that Mackerel *Rastrelliger* spp.) forms an important fishery.

Cambodia: The various littoral families of hes like Sciaenids, Carangids, Trichiurids and naller sharks appear to form the principal neritic lagic fish stocks. Oil Sardine and the Mackerel not form fisheries.

Indonesia: The neritic pelagic fish stocks appear comprise various Sardines, Carangoids and to small extent Mackerel.

Philippines: Various species, the Mackerel (*Rastelliger* spp.), Anchovies and Carangids form the eritic pelagic fish stocks.

New Guinea: Similar to Indonesia.

In all the countries listed above in addition to e fisheries composed of the above species, there e also other valuable fisheries. The prawn fisher- s are of some importance for Pakistan, west coast India, some parts of Malaya, the Philippines d probably in many other areas, although separate gures are not available. The crab fisheries com- osed of species of *Neptunus*, *Scylla*, etc. and the uids composed of species of *Sepioteuthis* are obably present also in most of the areas, although e exact distribution is not understood. The ustacean and molluscan fisheries are dealt with other committees, but they are mentioned here ving to the fact that the above-mentioned fisheries lo belong to the neritic zone.

ZONE II.

The neritic pelagic fish stocks of Australia pre- nt a very different pattern from that of the ntral area. The most important species are the rracuda, the Spanish Mackerel, Sphyraena and rious sardines. The species of sardines are ose not represented in the tropical areas, but common with the central area dealt with above der Zone I, the Spanish Mackerel comprising ecies of *Cybium* (*Scomberomorus*) seems to form an portant fishery.

ZONE III.

The third category is presented by Japan, where e principal pattern of neritic pelagic fish stocks is milar to Zone I in that the sardines and the mac- rel contribute a very large share to the total pro- ction. The principal fishes according to replies ceived are the Herring, the Sardine, the Mackerel, the Horse Mackerel, the Yellowtail and the Flying Squid. The species of sardines, mackerel and horse mackerel are all different from those which have been reported for the central area, as also for Australia. As may be expected, the fisheries present a considerable similarity with those of Korea and also some parts of the Chinese coast. The material for a correct evaluation of the fisheries of the above two countries is at present not available.

Statistics. The statistics of production of the principal types of fishes have been given separately. For details and trends of production, the original reports may be consulted and for most countries detailed statistics are not available.

Desirable Detailed Investigations. It is natural that the replies received relating to suggestions for detailed work were largely guided by the principal fisheries of those countries. A general enumeration of the problems are as follows :—

India : *Rastrelliger*, *Sardinella* (Oil sardine), Other categories.

Japan : ..... All forms

Cambodia : *Scomber brachysoma*, *Cybium* sp., *Scoliodon* sp. Sciaenids.

Philippines : ..... Scombroids

Malaya : Carangids, Scombresocids, *Stolephorus*.

Australia : ..... All forms

Thailand : *Rastrelliger*, *Caranx*, *Sardinella*, *Anodontostoma*, *Stolephorus*.

Pakistan : Sciaenids, Sardine, Mackerel, Threadfins, Mullets.

Ceylon : Clupeoids, *Stolephorus*, Carangoids, *Rastrelliger*.

Among groups suggested for further investigation, Sardines, Mackerel, Stolephorus, Scomberoids, Sciaenids and Carangoids predominate.

Progress of Investigation. It is apparent from replies received that active investigations are in progress in the various countries as given in the following table. The difficulties encountered in the work are also appended.

Work seems to be particularly advanced in Japan where various research workers are actively engaged in work relating to various fisheries. Even here political boundaries existing in the seas where fisheries extending beyond the artificial barriers have been an obstacle to progress. For the prosecution of various programmes Japan has suggested closer collaboration with the Korean and Soviet Republics. In Australia work has been in progress on the Barracuda, the various Clupeoids, Scomberoids, etc. In India work on various neritic

	Investigations undertaken.	*Progress achieved*	*Difficulties encounter*
India ..	Biology of Oil Sardine, Mackerel, Silver Bar, Seer Fish. Analysis of Commercial catches. Chemical composition of Mackerel.	Breeding season of oil sardine, Food of Mackerel, Key for maturity state of Mackerel, chemical composition of Sardine & Mackerel with special reference to fat, age, composition of commercial catches.	Absence of seaworth search vessel is the difficulty.
Japan ..	Most of the major fisheries investigated in great detail for the past several years.	Manifold results achieved. Biology, distribution etc. of most species fairly well known. Full statistics available.	Insufficient funds. quate staff. Interna boundary on sea so Sakhalin. Complexity process in collecting tics.
Cambodia	General studies on fish fauna and fisheries carried out formerely, but interrupted by the war and subsequent events.		
Philippines ..	Biology of *Sardinella*, *Rastrelliger*, and *Decapterus*	*Rastrelliger* : size weight relation ; size composition of catches, etc.	Limited funds and re personnel.
Malaya ..	Preliminary studies carried out ; detailed work being started.	Issue, return and checking of specially designed forms.	Illiteracy of fisherme their non-use of weig
Australia ..	Biology of Barracouta, Spanish Mackerel, Australian Salmon, Jack Mackerel, Pilchard, Anchovy, etc.		No special difficultie
Thailand ..	Biology of various species	Investigation in early stages	Shortage of funds, nical experts & equi
Pakistan ..	Biology of sardines and mullets		Non-availability of and vessels.
New Guinea ..	..	..	Staff inadequate
Ceylon ..	..	..	..

pelagic fish stocks has been in progress, but work in this country has been confined to the inshore areas where alone intensive fishing is now taking place. Programmes on a somewhat smaller scale exist in the Philippines, Thailand and Pakistan, but in these countries inadequacy of research personnel, limitations of finance and equipment seem to have restricted the progress. In Malaya, Cambodia, Viet Nam, Indonesia, Ceylon, New Guinea and Burma no research programmes of an active nature appear to be in progress at present, although much background has already been covered for Indonesia, Viet Nam and to some extent for Ceylon.

Lines of Co-operation. It is natural that in the formulation of future work of the Neritic Pelagic Fisheries Sub-Committee, the geographical patterns into which the member countries of the Indo-Pacific area would fall based on the composition of the fisheries would require attention. The tion is particularly clear that personnel, ment and funds are somewhat inadequate f central area treated in this report under Z whereas both personnel and equipment are m less adequate for the neritic pelagic fish covered by the countries, Australia and Japa

Closer collaboration to utilize full results o relating to neritic pelagic fish stocks among m nations of the I.P.F.C. may therefore be ind as follows :

(a) interchange of information, personnel methods of interpreting data and amongst the countries classified Zone I ;

(b) collection of information on neritic p fishes which have a common distri between Australia and Zone I studies on Spanish Mackerel) ;

(c) collaborated effort amongst countries forming the northern group, viz. Japan and her neighbours ;

(d) pursuit of studies relating to fish stocks common to the fisheries of the northern countries of the area and the central area (Zone I).

Standardization of Methodology. Much work hav-g already been in progress in both Australia and ıpan on neritic pelagic fish stocks, the methods study adopted in those countries should be of nsiderable value to the less advanced programmes Zone I. The replies from various countries dicate that the points on which standardization desirable are as follows : (a) Species nomenclature Latin and common names ; (b) Meristic counts ch as fin rays, number of vertebrae, etc. (c) ength measurements ; (d) Standard maturity ales for important fishes of the region, and (e) tandard classification of ovarian ova.

It should be emphasized that standardization ould never be carried to an extreme so as to revent development of new ideas and techniques. ufficient flexibility should be left to the actual searchers to assess methods expected to be most uitful to the elucidation of their problems.

Co-operative Projects. In the questionnaire suggestions were invited from member governments s to what work carried out in the neighbouring ountries would be of interest to them. The eplies received are as follows :

India requires information on Sardines and Mackerels from all member countries and on Bombay Duck from East Pakistan and Java.

Philippines requires information on Sardines, Mackerels and Carangoids (esp. racial and systematic studies) from all neighbouring countries ; also information on oceanographic studies of adjacent seas.

Australia requires co-operation from Ceylon and other countries to study *Cybium commersoni*.

Thailand is interested in work carried out in Philippines, Indonesia, etc.

Pakistan is interested in results of work done in India and Ceylon.

Ceylon wants information on work done in India ;

Japan wants information on work done in her neighbouring countries.

Similarly, suggestions for co-operative projects rom one or more countries were also invited. This as generally been supported, but specific subjects have not been suggested, although India has suggested co-operative studies on sardines and mackerel fisheries ; Pakistan wants co-operative studies on Hilsa fishery and Australia wants co-operative studies on Cybium fisheries.

Over-fishing. The problems of possible overfishing of pelagic fish stocks or conversely the possible intensification of fishing activities have been included in the questionnaire for comments. Replies to the questions indicate that most member countries do not find any signs of over-fishing. Philippines has replied that the sardine catches in Manila Bay and the Visayan Sea have diminished consequent on intensive fishing. The sardine fisheries have, however, been known to fluctuate widely and it is difficult definitely to ascribe the decline in sardine fisheries to over-fishing. All countries are agreed that neritic pelagic fishing activities could be intensified by the provision of mechanized equipment and ancillary shore facilities.

Publications. The publications issued by various countries are listed together in the reports sent by various member governments.

Recommendation. Information collected against the questionnaire has been analysed and given above, but it is difficult for the Sub-Committee to make any recommendations at this stage on the various subjects dealt with in the questionnaire. Further, although a meeting of the Sub-Committee was suggested to take place in the Philippines along with the Eighth Pacific Science Congress held at Manila in November 1953, the response to the suggestion was not adequate enough to hold a special meeting and for the exchange of ideas prior to the submission of this report. This is only natural owing to the vast nature of the subject dealt with by this committee and the inadequacy of information from various sectors so frequently pointed out at the previous meetings. The suggestions made in this report therefore are purely points for discussion which are being made by the Rapporteur and need not be taken as the views of the committee as a whole.

Technical Committee I may wish to examine these proposals further at the 5th Meeting and submit concrete suggestions to the Council.

1. *Statistics* : The absence of statistics of production in relation to neritic pelagic fish stocks, of data on the composition of such fish stocks and of monthly and yearly trends of production is a serious obstacle in the assessment of the fisheries of most countries. The member governments should be strongly urged to develop statistical services which

will keep standing reports of fish landings and trends of production from time to time.

2. Collection of such statistics involves problems of methodology which have to be studied because total enumeration of landings either species-wise or craft-wise would be impossible in most of the countries of Zone I. The perfection of suitable sampling techniques to estimate total production and the composition of that production will have to be given priority. Work for the development of such sampling techniques is already in progress in India and possibly at other centres and Technical Committee I may give its views on the development of suitable techniques for computing statistics.

3. The Committee should formulate details for standardized procedures for research. To begin with, definitions of characters used in biological accounts and publications may be drawn up for general adoption.

4. Although the replies received from Member Governments do not show any possible over-fishing, it is probably desirable to keep in mind the conservational aspects when dealing with any large-scale developmental programme and the Council may recommend to the member governments to make close studies of the trends of production and changes in the trends of production consequent on the introduction of mechanized gear in areas which have been solely dependent on local craft.

5. A collaborated programme of research should be drawn up for the Mackerel, *Rastrelliger*, in which India, Ceylon, Malaya, Netherlands, Thailand, Viet Nam, Philippines and Indonesia should be invited to join.

6. A combined project for study on the oil sardine may be taken up as a collaborated project between India, Pakistan and Ceylon.

7. All member countries of Zone I where fishing is from the inshore belt should be persuaded to undertake exploratory surveys to discover the limits of neritic pelagic fish stocks in the off-shore waters, because, in most cases, only those areas adjoining the coasts are being fished at present.

Interchange of methods of fishing: There is another important aspect of the work on neritic pelagic fisheries which requires mention here. One of the functions of the Council is to promote means for increased fish production in the areas. Most countries have mentioned the need for more intensive exploitation of neritic pelagic fish stocks. One of the means for intensive fishing no doubt is mechanization and this is being slowly adopted in many countries. Side by side with mechaniz of the fishing fleet which will take a conside time, there is another possible means by w fish production by inshore fishing could be aug ted. A close study of the methods used i shore fishing for neritic pelagic fishes in the va coasts of the Indo-Pacific area shows a very range of techniques some of which are extre efficient, while others are less so. Introdu of new fishing methods in a certain area r possibly result in increased production becaus existing methods in that area may not alway the best suited for a particular fishery. Th very wide scope for extensive trials on introdu of fishing methods for neritic pelagic fish s and the Council should bring this to the noti the various member governments with the gestion that efforts should be made for such in fishing experiments which do not entail heavy c expenditure. To pave the way for such fi experiments and interchange of fishing equip the Council may consider (a) the desirabil each member government compiling a list of fishing traps and other equipment indigeno their country together with the names of ag that may be able to supply them to other coun (b) to lift import and export barriers for specialized fishing equipment between the m countries of the Council to encourage the fre of indigenous fishing equipment between the tries.

5. Oceanic Fisheries

The following Resolutions were assigned Tuna Sub-Committee at the 4th Meeting :

" That member Governments be req to provide the Secretariat for transmission t rapporteur of the Tuna Sub-Committee d summaries of such data concerning the ecol the Tuna prior to the next meeting of the Cou

" That the Council recognizes the ne standardization of observations of the biol Tunas and directs that instructions for such ardization shall be included in a handbook d procedures ".

The Sub-Committee (Rapporteur, Dr. Royce, of the Pacific Oceanic Fishery I gations, based on Honolulu) has given a full on its activities, up to October 1, 1953. I Ceylon, Netherlands, New Guinea, Pa Viet Nam informed the Sub-Committee t work on the ecology of tuna has been compl their countries. Neither was any work o done in Indonesia.

1. The collection of additional raci for the Pacific Ocean area by the

PELAGIC NERITIC FISHERIES—LANDINGS IN METRIC TONS

Japan*

1.	Mackerels (*Pneumatophorus* spp.)	202,678
2.	Sardine (*Sardinia melanosticta*)	326,700
3.	Herrings (*Clupea pallasii*)	213,033
4.	Horse Mackerel (*Trachurus japonicus*)	123,630
5.	Yellowtail (*Seriola quinqueradiata*)	34,595
6.	Saury (*Cololabis saira*)	116,390
7.	Flying squid (*Ommastrophes pacificus*)	288,900
		1,305,926

India* (does not include figures of Kathiawar coast and mechanized vessels).

1.	Mackerel (*Rastrelliger kanagurta*)	90,688
2.	Oil Sardine (*Sardinella longiceps*)	21,851
3.	Other sardines (*Sardinella* spp. and *Dussumieri* spp.)	58,244
4.	Clupeids and white baits (*Engraulia, Stolephorus, Hilsa, Pellona, Coilia*, etc.)	51,025
5.	Sciaenids (*Sciaena, Otolithus, Sciaenids.*)	33,426
6.	Silver Bellies & *Lactarius* spp.	16,518
7.	Bombay duck (*Harpodon nehereus*)	15,356
8.	Ribbon fish (*Trichiurus* spp.)	23,524
9.	Soles (*Cynoglossus* spp.)	12,875
10.	Prawns & crustaceans (Penaeids, Neptunid Crabs)	76,199
11.	Elasmobranchs (*Scoliodon* spp. various rays and sharks)	28,293
12.	Other fishes	99,711
		527,440

Philippines (based on 2 years' figures)

1.	Mackerel (*Rastrelliger* spp.)	5,496
2.	Sardines (*Sardinella* spp.)	2,747
3.	Herrings (*Hurengula* spp.)	2,502
4.	Others	not known

Australia (based on figures of 1945-51)

1.	Barracouta (*Thyrsites atun*)	5,035
2.	Australian Salmon (*Arripis trutta*)	2,994
3.	Spanish Mackerel (*Cybium commersoni*)	454
4.	Tailor (*Pomatomus pedica*)	590
5.	Ruff (*Arripis georgianus*)	363
6.	Others	Not known

Other countries

	Mackerel	*Sardines*	*Others*	*Remarks*
Pakistan	2,947	3,861	5,944	
Thailand	16,000 (fresh) 5,000 (salted)	39 (salted)	..	1950 figures
Ceylon	2,024	9,003	..	1952 ,,
Cambodia, Malaya, New Guinea	Not Known			

NB:—The figure for Mackerel under Ceylon includes *Chirocentrus dorab.*
Under Pakistan, the figures presumably refer to Spanish Mackerel and Seer fishes.
Under Thailand the figures refer to Rastrelliger spp.

(*Based on the average of three years' figures.)

Oceanic Fishery Investigations have emphasized the area near the equator in order to better understand the relationship of the large and complex tuna populations in that zone. Analysis of the data on all four species is proceed-

ing and that needed for an expanded report on the yellowfin tuna is nearly completed.

2. An important addition to racial data on yellowfin tuna and a tuna provisionally identified as *Kishinoella tonggol* from Somalia in East Africa was obtained through the efforts of the FAO and its technical assistance project in that country on which Mr. A. Fraser Brunner is biologist. Analysis of these data is nearing completion at the Pacific Oceanic Fishery Investigations and a preliminary report should be available soon.

3. Collection and exchange of information on the ecology of tuna has proceeded slowly. The information was requested from the Member Governments by the Secretariat and replies have reached the Chairman of the Tuna Sub-Committee from Australia, Burma, Ceylon, Netherlands New Guinea and the United States. This information is summarized below.

4. The Pacific Oceanic Fishery Investigations has furnished to the Fisheries Division of the FAO the instructions for observations on the biology of tunas which are in current use. It is understood that these instructions will be incorporated in handbooks now being prepared.

5.1 *Studies on the Ecology of Tunas*

In response to a resolution of the Council at its fourth meeting member countries have submitted information on the ecology of tunas. Most of the data is in the form of abstracts of published papers but is usually supplemented with a brief discourse by the compiler (see Technical Paper No. 13).

It is envisioned that this ecological information on the tunas will provide the best possible basis for planning fisheries exploration. Therefore it is summarized in a way which may serve as a guide in planning exploratory cruises for the open ocean species—skipjack (*Katsuwonus pelamis*), yellowfin (*Neothunnus macropterus*), bigeye (*Parathunnus sibi*), black tuna (*Thunnus orientalis*), and albacora (*Germo alalunga*)—about which most is known.

No complete ecological studies have been accomplished but many observations have been made relating the occurrence of tuna to temperature, latitude, proximity to land, currents, their food habits spawning locations, etc.

The temperature relationship is a perpl one. All species occur over considerable r of surface temperature, e.g., *Katsuwonus* from to 32° C., *Germo* 14°-32°, *T. orientalis* 5° However, several authors report that in a s area the range is much less and the tuna frequ are found between narrow limits of temper in one place at one time. Therefore if scho tuna are located, further exploration might follow their temperature zone.

Too little is known of spawning to fully its importance in concentrating fish. Most sp appear to have extensive spawning seasons and and to require food while spawning. Hence probably do not respond to spawning wi regard to food as some fishes do.

Latitude is valuable in locating *Neothunn* the equatorial Pacific, where they are most abu between 2°S. and 5°N. from about 140°E. long to at least 120°W. longitude. *Parathunnus*, o other hand, is widely distributed in waters 5° to 30°N. latitude.

Some species, e.g. *Neothunnus*, are frequ more abundant near land, which may be islands or seamounts. However, this cann assumed to be true simply because fisherie located there. The range of the vessels ma limited or they may not need to go far to their fish.

Currents too are important, especially the K shio, which is the route of migrating *Katsu* and *T. orientalis* off Japan.

The kind of food appears to be of little he locating them. All species are voracious and great variety of fish, cephalopods and crust some from a hundred fathoms or below. S food also seems unimportant, since even *Neothunnus* gorge on tiny crustacea when abun

But the common factor in the occurrence of tuna appears to be the total quantity of food, in turn depends primarily on the nutrients o surface layer. These come from upwelling o water from the depths of the ocean or from r The upwelling occurs along the Equator or currents impinge on land and in the great e or gyres of the ocean. Concentrations of tuna without an increase in nutrients may also between converging currents where surface w sink and leave behind the food animals. Dou the special importance of the currents is bo enhancing and concentrating the food supply

Such concentrations of the tuna food ma be evident from routine methods of sampling cause if tuna are abundant the food may be

fast as it is produced. Also, the producing aters may follow the normal fluctuations of the rrents and the tunas may concentrate where the *erage* food production is greatest, which is not cessarily the location of the largest standing crop.

Therefore the most auspicious places to seek nas are those which produce more food and conrsely the most knowledge is to be gained by nultaneously finding the distribution of the fish d determining the behaviour of the ocean curnts in regard to producing or concentrating food.

The following is a summary of additional inrmation received from Member Governments.

ıstralia

Robins, J. P. (1952),—Further observations on e distribution of striped tuna, *Katsuwonus pelamis* , in eastern Australian waters, and its relation to rface temperature. Aust. J. Mar. Freshw. Res., 3, No. 2: 101-110. (Statements also include ference to current work by the CSIRO.)

Investigation leading to the accumulation of formation on the ecology of tunas in southeastern ıstralian waters was commenced in August 1950. he two species concerned were skipjack or striped na (*Katsuwonus pelamis*) and southern bluefin na (*Thunnus maccoyii*). From these studies it is dicated that the striped tuna is concentrated along e east Australian coast in time and space according the seasonal fluctuation in environment. Temerature was the factor considered in the environent.

During late spring, summer, and early autumn ere is a progression southward of the two limiting mperature boundaries (15.4°C. and 20.5°C.) id in late autumn, winter, and early spring there a recession northward ; there is also a synchronous ovement within these limits of the striped tuna pulation in east Australian waters.

It has been shown (Robins 1952) that striped na are taken most plentifully in waters of temerature 16°C. and 18°C. over an investigated nge of temperature of from 14.0°C. to 22.9°C. preference for bodies of water with slightly varyg temperature is evident, i.e., concentrations of na occur in zones affected by tidal and ocean rrents.

Temperature appears to exert a greater influence pon striped tuna's movements than does food. was found that tuna at the northern limit of aprent distribution, fed on a diet of postlarval upeoids mainly, whilst to the south the diet consted of euphausians. It was possible during the urse of investigation to find this area where change in diet took place, but unfortunately no concentrated work was carried out in this area, which again showed seasonal movement south and north. Although food was abundant at each seasonal limit of the tuna's distribution, it was not a strong enough factor to keep them in the general area when temperature changed.

Southern bluefin tuna show fluctuations, from season to season, in availability, but this problem appears mainly to be a reflection on the method of fishing and the area fished. Most fishing is done by trolling from small boats which confine their activities to a localized area which is subject to quick change brought about by variations in weather conditions. Favourable fishing conditions are easily disturbed and sometimes the restitution of these conditions takes considerable time. Again temperature changes appear greatly to influence the species behaviour. In offshore waters good catches of southern bluefin tuna are made, notably along current lines where temperature changes take place, and around bold headlands in inshore waters.

It also seems that different year groups prefer different niches in the environment, e.g. the younger the year group the closer it appears to the coast where temperatures are slightly lower than in offshore waters. Although abundant food supply is available in inshore waters where younger tuna are taken, the older groups remain offshore, e.g., the 1-year group of southern bluefin tuna in the 1952-1953 season was taken only in inshore waters where pilchards were abundant, whilst in waters further offshore (20 miles) the older groups fed mainly on carangids and cephalopods. The condition varies from year to year, i.e., when the 1-year old group does not appear on the coast and the fishery is confined to another older year group.

When facilities for intensive research are available, a correlated programme of studies of tuna occurrence, tuna food supply, hydrology and oceanography will be vigorously prosecuted.

Philippines

Tapiador, Domingo D. (1951).—A report on deep-sea longline fishing for tuna in the Philippines. Bulletin of the Fishery Society of the Philippines, Vol. 2, pp. 3-27.

Because of the well-established correlation between these factors (water current, temperature transparency, bottom topography), and the presence or absence of fish, especially the tuna, as much oceanographic data as could be gathered with the little facility for such type of work were taken on the fishing ground where the tuna longliners

"Dinia" and "Molly" obtained good catches of yellowfin.

From an analysis of these oceanographic data, it is shown that the successful yellowfin catches were made mostly in waters where the depth ranges from about 550 to 2,200 fathoms (1.000-4.000 meters); when the temperature ranges from 28°C. to 29°C. at the surface and 27°C. to 28°C. at the sub-surface layer of about 165 feet (50 meters); and where the salinity ranges from 33 to 34 parts per thousand.

Wade, Charles B. (1951).—Larvae of tuna and tuna-like fishes in the Philippine waters. U.S. Fish and Wildlife Service, Fishery Bulletin No. 57, Vol. 51, pp. 445-485.

Based upon the seasonal distribution of larvae in the present collections, it appears that the most intensive spawning occurs during December, January and February, and that June and July represents the period of least spawning. Although it was impossible to conduct periodic re-examination of any specific area to determine fluctuations in the abundance of tuna-like larvae, six irregular trips to the Sulu Sea helped to confirm the above data. On these trips tuna-like larvae were taken most abundantly during December and January, while June and July were the least productive. Comparison of catch records with surface water temperatures during these trips shows that the greatest number of larvae was taken at the periods of lowest water temperature and the least number was taken when the temperature was high. No attempt has been made in this bulletin to discuss the ecology of tuna-like larvae as a group or as species.

Tows made during the hours of darkness, 1800 to 0600, produced more larvae than those made in daytime, 0600-1800. During the day, 87 of the 250 plankton tows made (34.7 percent) were successful with an average of 1.78 specimens per tow. Of the night tows, 105 of 212 tows made (49.6 percent) captured larvae. The average number of specimens for each night haul was 6.55. A total of 1,395 larvae was collected at night and 447 during the day—or 75.8 percent of the total specimens were taken after dark. Night is not only more productive of specimens, but it seems that larvae are then more widely distributed. It also appears that there is some vertical migration downward during the day and a return to the surface at night.

Ronquillo, Inocencio (1953).—Food habits of tunas and dolphins based upon the examination of their stomach contents. (In press)

Three hundred and four stomachs of tuna collected in Philippine waters from September 1947 to June 1949 were examined. These include yellowfin (*Neothunnus macropterus*), 115 Sk (*Katsuwonus pelamis*), and 75 oceanic (*Euthynnus yaito*).

Fish form the most important item of the these wanderers of the sea. These are either p demersal, shore or coral reef fishes. The juv of fishes constitute the more common arti the diet. These are best represented by the *nurus* larvae (Teuthididae).

The useless plectognathi fishes were found an important food item of these species and cate that they go near the shore and coral to forage there.

Of the larger fish included in the food it few specimens of *Auxis* about 250 mm. F.L. found in the stomachs of yellowfins 674 m fork length.

Rare and deep-sea fishes were seen in the sto of these species. Some of them were in goo dition. Among these are three newly rec from the Philippine waters that will be des later.

Pelagic invertebrates also form an imp food item of the tunas. In fact the larva juveniles of Stomatopods form the most imp single item of food both in numbers of the i duals and number of occurrences. Other in brates found eaten are squids and juvenile puses among the mollusks, and crab larvae s zoea and megalopa. Shrimps and young were also recorded.

These pelagic fishes are seemingly non-sel i.e., they are voracious eaters. They wou any living organism available.

Fifty-one families of fishes representing 11 were recorded from the stomachs of these species in Philippine water.

United States and Canada

Ganssle, David and Clemens, Harold B. (1 California tagged albacore recovered off Cal. Fish and Game 39 (4) : 443.

An albacore tagged August 4, 1952, 18 south of Los Angeles harbor was recapture No. 5 Choso Maru 550 miles southeast of on June 23, 1953.

Hart, J. L. et al. (1948).—Accumulate on albacore (*Thunnus alalunga*). Pacifi Sta., Fish. Res. Bd. Canada, Circ. No. 12, 8

Assembled data from the albacore fishery British Columbia and Washington coasts i and 1945-47. Examination of the stomach c

nearly 1.000 troll-caught fish showed pilchards, hovy, lanternfish, saury, squid, and euphausiids be the most important food items. Length quencies indicated that the fishery probably ends for the most part on two successive year sses of unknown age with modes at about 65 l 75 cm. Average weights of fish from individual s varied less in years when the length frequency ve showed only clear mode. Water temperatures which fish were taken ranged from 50°-70°F. st fishing was at 65°F. in 1947 and at 61°F. in 6.

McHugh, J. L. (1952).—The food of albacore *ermo alalunga*) off California and Baja California. ll. Scripps Inst. Oceanog., Vol. 6, No. 4.

Examination of 321 albacore stomachs taken in 50 and 1951 off the California and Mexican sts showed saury to be the most important food stituent, and it is suggested that the movements d abundance of this forage fish may control acore availability in California waters. Squid re second in importance in the stomach contents. There appeared to be little variation in feeding bits within the range of latitude covered (25° 40°N.) but there was a seasonal change, with h forming a higher proportion of the stomach ntents early in the season (June-July) than toard the end of the season (October). It is speculed that this change may affect the fishery in one two ways ; either the forage fish leave the area d most of the albacore follow them, leaving the w that remain to feed perforce on invertebrates ; the albacore, having changed their feeding habits, ase to strike at trolling lures and thus become available to the fishery.

Although all of the albacore were taken at the rface by trolling, some of the species of euphaids and cephalopods found in the stomachs incate that the fish had been feeding at some depths. uphausiids and amphipods were more plentiful the stomachs of fish taken in the morning ; squids, *euroncodes*, and *Vinciguerria* in those captured in e afternoon. There was no diurnal trend in the pearance of saury in the stomachs.

Murphy, G. I. and Shomura, R. S. (1953).—ongline fishing for deep-swimming tunas in the ntral Pacific, 1950-51. U.S. Fish and Wildlife rvice Special Scientific Report : Fisheries : No. 98.

Results of experimental longline fishing for llowfin (*Neothunnus macropterus*) and other large nas on three cruises across the equatorial current stem south of Hawaii in 1950 and 1951 are alyzed and inferences as to tuna ecology are drawn follows : Yellowfin tuna appear to inhabit greater pths as they grow larger, for the longlines, fishing estimated depths of 300 to 600 feet, take almost exclusively large fish (i.e. 80 to 150 pounds), although schools of smaller tuna are known to inhabit the surface waters in the equatorial Pacific. There is a concentration of the large, deep-swimming fish in the zone between 1° and 6°N. latitude. This concentration appears to be related to an increased food supply, shown by quantitative zooplankton hauls resulting from upwelling of rich water near the Equator. However, bigeye tuna, (*Parathunnus sibi*) are taken more abundantly north of this zone of high yellowfin concentration, and there is as yet no evidence of differences in feeding habits to explain this discrepancy. Good catches of tuna in the immediate neighbourhood of small islands indicate that the influences of the islands tend to improve the habitat for yellowfin for a few miles off their shores, but the broad general pattern of the species' distribution in the tropical central Pacific does not appear to be related to land masses.

The average size of yellowfin taken by trolling and live-bait fishing near islands is much smaller than that of fish taken by longline in the open ocean. The deeper hooks of the longline frequently make better catches than those fishing at shallower levels, but the average sizes of the fish taken at the three hook levels are the same. Males far outnumber females in longline catches of both yellowfin and bigeye. Gonads collected from the catch provide no evidence that either the oceanic or island concentrations of tuna are associated with spawning migrations.

Partlo, J. M. (1950).—A report on the 1948 albacore fishery (*Thunnus alalunga*). Pacific Biol. Sta., Fish. Res. Bd. Canada, Circular No. 20.

Reports 86 per cent of the catch of research vessels taken at surface water temperature of 58°-60°F., none below 57° nor above 62°F. in northeast Pacific in 1949. Stomach contents of albacore from British Columbia waters mainly rockfish (*Sebastodes* spp.), saury, squid, and euphausiids. Rockfish and saury, the two most important items, were about equal in volume, but rockfish (about 2 inches long) were much greater in numbers. Stomachs of fish taken off N. California contained anchovies and pilchards.

Powell, D. E. and Hildebrand, H. A. (1950).—Albacore tuna exploration in Alaskan and adjacent waters—1949. U.S. Fish and Wildlife Service Fishery Leaflet 376.

Reports exploratory trolling by the research vessel *Oregon* in August and September of 1949 in waters within about 300 miles of the coast from off Washington to off southern Alaska. Only scattered catches were made and no large schools were seen.

Fish were taken within the surface water temperature range of 56.8° to 61°F., but the best fishing was found at temperatures above 58°F. Alba-

core were caught mostly within the blue oceanic water and none were taken in the green, colder coastal water, although some catches were made in mixed bluegreen water.

Stomach contents were predominantly euphausiids and young *Sebastodes* spp., with squid also common at nearly all localities. Rockfish were replaced by saury in albacore taken over a seamount in the Gulf of Alaska at the most northerly location fished.

Possible association of various birds, mammals and fishes with albacore occurrence is discussed, but little evidence of such association was discovered.

Much of the successful fishing was done over seamounts and shoal areas, and it is suggested that albacore may tend to congregate in such habitats.

✓ Powell, D. E. et al. (1952).—North Pacific albacore tuna exploration—1950. U.S. Fish and Wildlife Service Fishery Leaflet 402.

Results of exploratory albacore fishing by research vessel *John N. Cobb* off Oregon to Alaska in 1950. Inshore northerly migration of albacore in northeastern Pacific determined to a great extent by movements of 57.5°F. surface water isotherm. Fish seemed to be mostly in fingers of warm water extending in from the southwest early in the season. Good fishing was usually in the warm blue oceanic water, little catch in colder green coastal water. Thermocline depth in productive areas averaged 60 feet; fishing was poor where the surface warm water layer was very shallow. Fish were taken within a surface temperature range of 54° to 62°F., most of the catch being made between 58° and 60°F. Gill net catches were mostly in the part of the net within 3 fathoms of the surface.

Food was predominantly young *Sebastopodes* spp.; saury and squid were also important items. Diurnal trolling catch variations indicated morning and evening peaks of feeding activity, although good catches were also made occasionally in the middle of the day.

In late June off Oregon, when the fish first appeared, trolling took them singly or often in pairs, the first indications of schooling being seen in early July. Trolling was often done on sighting of jumping fish, but no large schools were seen throughout the season. Schools sighted were usually small and travelling fast. Gill net catches were in small scattered groups.

Only scattered and few albacore were found in the Gulf of Alaska in late August.

Reintjes, J. W. and King, J. E. (1953).—Food of the yellowfin tuna in the central Pacific. U.S. Fish and Wildlife Service Fishery Bulletin 81.

Study of the stomach contents of 1,097 yel tuna of various sizes captured by trolling, long and live-bait fishing in surface and sub-s inshore and off shore habitats in the tropical Pacific during 1950 and 1951 revealed the foll information of ecological interest:

Yellowfin from inshore and oceanic environ were, on the average, equally well fed. three most important food categories—fish, and crustaceans—the smaller yellowfin fro shore or surface waters contained higher prop of crustaceans than did the larger fish from surface oceanic waters. Yellowfin taken afternoon were better fed than those captu the morning, indicating that the tuna feed the daylight hours. The average volume of st contents was roughly proportional to the zoo ton concentration, and the fish taken in th zone of high longline catch rates and high zoo ton abundance near the Equator contained amounts of food than those captured at more erly or southerly latitudes. Since the tuna co a great variety of organisms ranging in size very small plankters to fish one-third thei length, it is thought that their distributio abundance is not determined by the occu of any specific food items but rather is infl by the total amount of food present in an area.

✓ Sette, Oscar E., *Ms.*—Nourishment of Pacific stocks of tuna by the equatorial circ system. Presented to Eighth Pacific Science gress, 1953.

Data from 390 hydrographic stations, bathythermograms, 399 plankton hauls, an fishing stations in the east central equatorial demonstrate that divergence and upwelling equator enrich the surface waters with in nutrient salts stimulating plankton prod Surface waters containing the plankton drift erly to an adjacent convergent zone. By in this is believed to maintain a concentrat organisms of the trophic level above pla mainly small fish and squid, which in turn prise food for yellowfin tuna, *Neothunnus terus* Temminck and Schlegel. The sys generated and its structure is largely gover the winds. It is most effective in the easte of the Pacific Ocean owing to the greater pre there of strong southeast winds along the e Drift of the products of upwelling strongly we and feebly northward displaces them we and slightly northward from the area of m tense upwelling, causing the richest fishing to occupy usually a zone between 1° and latitude and extending from 135° to 165°W. tude.

Wilson, Robert C. (1953).—Tuna marking, a ogress report, Cal. Fish and Game 39 (4) : 429-2.

Albacore, skipjack and yellowfin are being tag-d successfully with plastic tube through body in ck of second dorsal fin. The returns give evi-nce of migration of albacore north along the coast California in autumn. The work is continuing d many of all three species are being tagged.

III. MISCELLANEOUS FISHERIES

On the basis of the suggestions of the Executive mmittee regarding procedure, in this chapter have grouped together those fisheries which do t strictly fall within the purview of the Sub-Com-ttees on Marine or Freshwater vertebrates, that

(a) Invertebrates, both freshwater and marine
(b) Useful Aquatic Vegetation (as against weeds)
(c) Hydrology and Plankton

It is believed that if the Council desire to main-in the subject of Taxonomy on its worksheet, each the Council's specialized groups should concern elf with the systematic treatment of the organisms th which they are concerned, but that, for scussions of a general nature as to methods of conomic treatment, the Panel for Miscellaneous sheries might well be charged with the study of ese questions.

Plankton Studies

In view of the difficulty experienced in the past obtaining the attendance of specialized plankton rkers at Council Meetings, the subject of plank-n was chosen as the theme for the Council's incipal Symposium at the 5th Meeting and the sistance of UNESCO was enlisted as co-sponsor. This has permitted several plankton workers om within and without the area to present their ews on this occasion and will, it is hoped, give a w incentive to the Council's Sub-Committee on is important subject.

In particular, we must thank Dr. C. J. Fish of e Narragansett Marine Laboratory, University Rhode Island, U.S.A. and Prof. A Thiennemann Hydrobiologisch Anstalt, Ploen, Holstein, ermany, who have travelled a considerate distance order to preside over this Colloquium.

The assignment given to the Plankton Sub-Com-ittee at the Manila Meeting was as follows :

" That the rapporteurs, Dr. K. F. Vaas (Fresh ater) and Mr. R. S. Esquerra (Marine) be requested continue correspondence with plankton workers the region and that every effort be made to present the next Council meeting a report on (a) standardization of methods of Plankton collection, etc., (b) the types of planktonological programmes suitable for the region."

The reports received from the above rapporteurs are summarized as follows :

6.1 *Freshwater Plankton*

Acting on the above Resolution, the rapporteur approached various workers and obtained replies from Drs. Pillay (India), Chacko (India) and King (U.S.). This correspondence, together with the recommendations presented to the 4th Meeting, and printed in the Proceedings (pp. 67-70) forms the basis of the following suggestions and notes on progress achieved in the period 1952-53.

6.11 *Plankton in Fish Ponds*

In a paper on the plankton of freshwater fish-ponds in Madras, and presented to this Meeting as Symposium Paper 13, the author summarizes the knowledge on the subject for the area involved, while it was reported that the Indian Government had collected relevant data on the planktonological programmes in that country and had transmitted that information to the Council.

In a similar paper, presented by Vaas to this Meeting, (Symposium Paper 2), an ecological classification of the plankton and biological environment of Indonesian freshwater fish-ponds is tentatively given, while a similar approach to brackishwater Chanos ponds was made by Vaas and Sachlan in a paper prepared for the first Seminar on Fishculture in Indonesia in May 1951, to be printed as Special Publication No. 2. It is hoped that these studies will be criticized by the Council, so as to indicate in which ways they ought to be completed and also to encourage others in similar work in other parts of the Region.

It is felt that the diet of the fishes cultivated in ponds should form the basic consideration as to the suitability of those ponds and, in this respect, the digestibility factor of the plankton must be closely studied. Outside of the Indo-Pacific area this problem has been envisaged and studied with marked success e.g. in Uganda with Tilapia.

The following types of programmes could be formulated :

(1) Classification of the plankton in various types of fishponds based on : (a) the feeding-habits of the fish, (b) the digestibility of the ingested food, (c) the influence of the technical measures taken by the farmer.
(2) Quantitative production studies on the plankton, without however disregarding the bottom fauna and the eventual supply of food applied by the farmer. Produc-

tion of suitable food to be compared with production of fish, at optimal rate of stocking and optimal size of the fish.

6.12 Plankton in Lakes, Marshes, Reservoirs, etc.

Although the plankton of many individual lakes, marshes, reservoirs etc. was studied in India, Indonesia and elsewhere, the only comprehensive study on such water bodies in an entire country known to the author is the one by Blache in Indo-China. After the results of two more investigations in Indonesia have been analyzed, an attempt will be made to give a classification of such waters in that country, taking the older classification of Van Oye as a guide.

It is suggested that in every member country, individual lakes and other bodies of water should be studied and the results integrated into a classification. For these large bodies of water plankton will be, relatively, of even more importance than in ponds. The primary aim of such a classification should be to act as a guide for the introduction of new species.

After inventory and classification, production studies should be carried out (re-suspended black and white bottle technique), so as to compare food production with fish production.

6.13 Indicator Species

Items 6.11 and 6.12 mentioned above, ultimately lead to the listing of " Indicator Species ", as indicated on p. 69 of Section I of the Proceedings of the 4th Meeting.

6.14 Standard Procedure, Sampling

As was suggested in the 1952 report, the methods used by J. Blache are advocated once more. However, many workers stressed the urgent need for methods permitting some sort of statistical treatment. As such treatment makes the use of multiple sampling compulsory, difficulties may often be encountered, notable when remote areas are being investigated, and a limited period of time can be spent on the spot. For this reason it is hoped that the Council, through one of its Sub-Committees, may assist to set up a procedure of sampling, in which the possibility of statistical treatment is combined with a minimum amount of labour involved in the procurement of the samples.

It is suggested to use borax for the neutralisation of the formaline.

6.15 Standard Procedure, Description of the environment

The suggestions of p. 69, Proceedings 4th Meeting, Section I, are repeated with the following additional remarks :

(a) Electric thermometer readings at different depths can be made easily wit apparatus of the French Firm " Me (Chemin de la croix rouge, Annec Savoie, France.—35.000 F.fr.)

(b) The use of electric apparatus such Bernheim cell is advocated.

Furthermore, a description of the propert the substratum should be included in any In studies on rivers and estuaries the nat the river bed and the catchment area must a described. In the description of ponds, the c methods (manuring, fodder, drying) should be and for lakes, reservoirs etc. a description surrounding land should be added, when dr into the lake is important. All data shou stated as p.p.m. (=mgr./1), oxygen always a or cc. as well as in percentage saturation existing temperature. It is emphasized th minimum programme stated on p. 69 appli field work, carried out on the spot without Analyses of stored samples are to be avoi much as possible.

6.2 *Marine Plankton*

At the Council's 4th Meeting held in the I pines, the problem of the Sub-Committe Planktonology (Rapporteur, Mr. Esguerra, I of Fisheries, Rep. of the Philippines) was to the programs of research in the and to consider the recommendations which be, firstly, for standardization, coordinatio promotion of progress in the field and, sec to indicate the relative importance and p which might be assigned to different types vestigations in the field. However, due to attendance this assignment has not been mented. It is hoped that a more represe attendance at the 5th Meeting may enable th Sub-Committee to carry out this assignment

It may be stated in general that due to th limited number of workers, and lack of s equipment and available funds to finance t vestigations, planktonological studies in the Pacific area have been very much handicappe

6.21 Activities of the Sub-Committee

It was proposed at the last meeting th views of present plankton workers be ca regarding (1) Standardization of methods of ton collection and interpretation of result (2) Program of planktonological research i gress in the area. The Rapporteur of th Committee on Marine Plankton has commu with the members and has received valuable mendations from Mr. Joseph King, Miss P and Dr. Prasad. It is hoped that the other m will send their views regarding the inquiries

:2 Recommendations for Standardization of Collection and Suggestions for Future Work.

The Sub-Committee makes the following sug-stions for the standardization of methods of ankton collection and analysis of catch as expressed contributing members of the Sub-Committee :

*It seems that before recommendations can made concerning gears, methods or programmes r plankton work there should be some general cision on what might be expected from co-ordi-ted plankton work in the countries concerned. udy of marine plankton could be discussed under e following headings :—

1. Taxonomic appraisal.
2. Seasonal succession and deviations from such succession.
3. Quantitative assessment.
4. Geographic distribution (and incidentally, indicator species).
5. Biological correlation (i.e. with fish, food chain components).
6. Hydrological correlation (and plankton as a measure of productivity).

Assuming that (1) (Taxonomy) is a necessary nd fundamental prerequisite for any plankton ork and that (5) and (6) (an understanding of the lankton as part of its environment) are the final nd ultimate aims of any programme, I suggest nat (2), (3) and (4) are the intermediate steps owards those ultimate aims and should be the *mmediate* aim of any programmes planned in the ea.

It is suggested at this stage that, although it has een proposed that " synthesis is our aim—not nalysis ", the former is hardly possible without he latter. Nor is it possible to say, without an nalysis of the plankton, what is likely to be of im-ortance. We can discover from examination of sh stomachs what may be important as food but o fully understand what part that food takes in he plankton, and by what conditions it may be ffected, we must go to the plankton itself. In hese intial stages it seems impossible to say what nay or may not be of importance. For instance, n N.S.W. waters the Salp, *Thalia democratica* hardly an organism which impresses either as a ood organism, or, due to its wide geographical istribution, as an indicator) gives promise of being n important factor in the annual turnover of plank-on and its appearance may assist in the interpre-ation of circulation characteristics. Therefore, lthough due to staffing difficulties plankton pro-grammes may have to be small, plankton at the moment should be considered as an end in itself.

A possible definition of a practical programme for any part of the area therefore might be : " To determine the characteristics (qualitative and quantitative) of the plankton of any area at any time of the year ".

The extent of the area would, of course, depend on resources but a programme to give a complete picture of at least one small area should always be possible, even if for practical reasons it were necessary to limit the survey to the succession in surface waters. If the survey could be extended over wider areas then information on geographical distribution can be accumulated and indicator species more easily identified (as was suggested by the Chairman of Technical Committee I, Mr. D. J. Rochford, for the Manila Meeting of the Council) ; and of course similar programmes by different countries in even widely separated areas, can assist in this. Meanwhile information could be accumulated on those species which are apparently important food organisms.

The taxonomy of the different groups present rather greater problems. Since literature is difficult to obtain in some of the member countries, keys of at least the major groups would be indispensable to workers.

The International Council are publishing sheets of identification keys for European waters ; surely with the impressive company of specialists in this area something similar could be attempted here. It is not a thing which can be immediately done but it could be encouraged and at least discussed. Keys are available for Australian pelagic Tunicates (Thompson, H., 1950) for some Australian Chaetognaths (Thompson, J. M., 1947) for Euphausiids (Sheard, to be published), for many Crustacean groups, etc. (Dakin & Colefax, 1940). We have, in the area, Dr. Prasad, a specialist on Copepods and many others who have specialized in Phyto- and Zoo-plankton groups. Perhaps some arrangements between the specialists concerned could be made so that simple and workable identification keys could be made to alleviate shortage of taxonomists in the area.

Lists of species do help to a certain extent in assisting geographical distribution but in no other way.

Regarding gears : this does not seem to be of great scientific importance as long as workers and others are aware of the limitations of the gear they are using.

Economically some uniformity is desirable. It has many times (H. Thompson) been recommended

*This section of the report is taken from a contribution received from Miss P. Kott of the CSIRO Marine Biological Laboratory, Cronulla, N.S.W. Australia, a Member of the Sub-Committee.

that Discovery type nets are already in such general use that they should be the standard equipment. They are not, of course, especially in shallow waters, always practicable. It would be interesting to hear the opinion of member countries on the use of these nets.

Hardy Indicators are useful especially as they entail little work in either the field or the Laboratory and are useful in compiling confirmatory data.

To summarize :

(a) Plankton programmes to determine the characteristics of the plankton of any area at any time of the year. The extent of the area to depend upon the resources of the station. Meanwhile, data on important food organisms should be accumulated.

(b) The serious consideration of taxonomists in the area and the Council to the preparation of identification leaflets similar to those published by the International Council.

(c) Standardization of gears to Discovery type nets and Hardy Indicators.

*While it is the object of most plankton research to obtain a measure of the productivity or available fish food present in an area, many investigations may have more specific objectives, such as the study of diurnal migration, vertical distribution in respect to the thermocline, geographical distribution of certain groups or species, etc. Although it is desirable that methods used in the field and in the laboratory should be standardized so as to yield data comparable with that collected at other times and in other areas, this can rarely be achieved. Each investigator will logically attempt to use the method within the range of his available finances and facilities which in his opinion will contribute the most toward his particular objective. Furthermore, new and improved quantitative plankton collecting devices are currently being devised and in all probability any presently adopted standards would soon become absolete. It is exceedingly difficult, therefore, to recommend methods of collection and of analysis that are adaptable to the limitations and objectives of most or all plankton investigations, or that might not soon require changing to keep pace with new developments.

In this report we should like to present, first, a general outline (table 1) of collecting and processing methods for the different forms of plankton, which we believe are capable of yielding uniform results and which possess no materially prohibitive requirements such as excessive cost or elab apparatus not easily obtainable or not already able at most laboratories. And, second, we describe in some detail our own methods of titative collection and analysis of zooplankton we believe have proven their worth in respe our particular objective of determining where can best make a living in the central Pacific.

One of the major projects in the research pro of the Pacific Oceanic Fishery Investigations, Fish and Wildlife Service, is to obtain inform on the relative or potential productivity of diff areas of the tropical and subtropical Pacific indices to productivity we have considered oceanic circulation, the concentration of chemical nutrients, and the abundance of zoop ton. Although the primary aim of our pla sampling is to obtain quantitative informatio the zooplankton population, a secondary obj is to collect tuna eggs and larvae for use in the of the spawning habits of tuna. Therefore sam gear and procedures which contribute toward objectives are utilized. Early in our studie tried nets of a variety of mesh sizes and emp different types of hauling methods. As a of this experimentation we adopted, as most factory for our purposes, a 30-minute obliqu to 200 meters depth employing a 1-meter 30XXX silk grit gauze. Descriptions of the the method of hauling, and the processing collections are given below :

The Net : Mouth diameter—1 meter ; from middle section—30XXX silk grit gauze (ape 0.65 mm) ; rear section and bag—56XXX sil gauze (apertures 0.31 mm). A more detailed cription of the construction of the net is giv figure 1.

For work in tropical waters, where zoopla may be sparse, we favour the use of the mete because of its large straining capacity. In minute haul at 2 knots approximately 1,000 meters of water pass through the net ; thus a s is obtained which is large enough to measur veniently and provides more adequate rep tation of the less abundant constituents, su fish larvae, than would be obtained with a smaller diameter.

The mesh of 30XXX grit gauze which mal 97 per cent of the straining surface of the net the majority of the fish eggs and larvae ar zooplankton, except the more minute forms as the microcalanid copepods, foraminifers Almost no phytoplankton is retained by th thus a " clean " sample of zooplankton is obt

* This and following pages were prepared by Dr. J. E. King, Fishery Research Biologist, Pacific Oceanic I Investigations, U.S. Fish and Wildlife Service, Honolulu, Hawaii, a member of the Sub-Committee.

The current meter: The amount of water strain- during each haul is estimated by measuring the w past a current meter suspended in the mouth the net and computing the total volume on the sumption that the flow-rate was uniform through- t the mouth of the net. Each current meter is librated before and after each cruise by towing ver a measure course at approximately the same eed used in making the plankton hauls. The erage of these calibrations is used to compute e volume of water strained in cubic meters for ch haul during that cruise. Within a limited nge of towing speeds the number of revolutions gistered by the meter indicates the length of the ater column passing through the net; multiplying is length by the area of the mouth of the net gives estimate of the water volume strained.

Current meters of the type constructed by the las Compass and Mfg. Co., Vashon, Washington, ve been found satisfactory.

Method of rigging: We have used both 5/32" d 1/4" diameter steel cable for hauling the meter ts. While the former should be of sufficient ength when towing at slow speeds with a shock sorber or accumulator in the towing system, the ter provides the greater margin of safety.

The nets and a 75 or 100-lb. weight are con- cted to the towing cable as shown in figure 1. e lengths of the connecting lines to the weight d the bridle of the net may be modified to suit erating conditions aboard the vessel. If the nch to be used for the hauling is not provided th a counter to measure the wire as it pays out, hetering block may be used for this purpose.

Method of hauling: In making the haul, the ving line bearing the net and weight is paid out wly at uniform speed. As the net is lowered, length of wire out and the angle of stray (from vertical) are recorded at 2-minute intervals. hen a calculated depth of 200 meters is reached, net is retrieved at a slow uniform speed. The gle and the length of wire out are again recorded 2-minute intervals. At a towing seed of about nots, an oblique tow to a depth of 200 meters, de in this fashion, requires about 30 minutes. suming that the towing wire represents a straight in the water, the net strains approximately the e amount of water for each meter of depth passed ough.

At the end of each haul the net is washed down roughly, concentrating the catch in the plankton k or bag. The collection is then transferred a 1-quart jar and sufficient formalin added to roximate a 10-per cent solution. The formalin eutralized with borax and a completed label is ed in the jar.

Statistical studies have shown that this method of hauling produces repeatable results.

Analyzing the catch: The zooplankton collections receive the following treatment in the laboratory:

(1) All organisms whose longest dimension is greater than 5 cm. are removed from the sample. The kind of organism removed and its displacement volume are recorded. Such organisms occur infrequently and are omitted from the basic analysis. Their occurrence may be studied separately and without affecting the results obtained from the more typically planktonic constituents of the hauls.

(2) All organisms with longest dimension between 2 and 5 cm. are next removed from the sample, identified as nearly as possible, and their displacement volume measured.

(3) The remainder of the sample, that fraction with longest dimension less than 2 cm. and constituting the bulk of the sample, is examined under a binocular dissecting-scope and its general composition noted. The displacement volume of this fraction is then determined after any artefacts, such as refuse from the ship, have been removed. This portion of the sample not further subdivided.

In measuring the displacement volume, the plankton is poured into a drainage sock of 56XXX grit gauze to filter off the preserving liquid. The draining plankton is then placed in a graduated cylinder of approximate size (usually of 50 or 100ml. capacity). By means of burette a known volume of water is added to the drained plankton. The differences between the volume of the plankton plus the added liquid and the volume of liquid alone is the displacement or net wet volume of that portion of the plankton sample.

Our present procedure does not include a detailed count of organisms occuring in the collections.

In line with the chief purpose of the study—to use the abundance of zooplankton as an index to productivity—it is desired to obtain an estimate of the amount of zooplankton in each sample that is potentially fish food of significant nutritional value. It was decided therefore to use the displacement volumes of the following as representing nutritional food:

A. The entire remaining fraction of the sample after the larger organisms, 2 cm. or greater in longest dimension, have been removed.

Ordinarily this portion of the sample is composed primarily of crustaceans and

chaetognaths with a small percentage by number and volume of "watery" organisms of low food value, such as jelly-fish and salps. As stated earlier this portion of the sample is examined under the microscope and classified as to its make-up of an average (mixed) composition, composed primarily of a swarm of one organism, or containing an unusual amount of unnutritious forms.

B. All annelids, crustaceans, cephalopods, and fish in the 2 to 5 cm. size category.

The following organisms in the 2 to 5 cm. category are not included as food : siphonophores, medusae, ctenophores, heteropods, and tunicates.

The sum of items (1) and (2) provide a single volume measurement for each sample which we accept as the best available estimate of the amount of zooplankton—as food—present at that time and place, subject to capture by the gear employed. This measurement would doubtless be more precise if all non-food organisms were sorted from the entire sample, but this would mean that a considerably smaller number of samples could be processed with the available personnel.

Adjustment for Diurnal Variation : An important source of variation in quantitative measurements on zooplankton abundance is related to the time of day of hauling. In central Pacific waters the volumes of night hauls, using the 200-meter oblique tow, have averaged about 1-1/2 times the volumes of day hauls. This is sufficient variation to obscure, in certain areas, the geographical and seasonal features of distribution which are of primary interest in our studies. A suitable adjustment for removing the effect of diurnal change has been devised by these Investigations, which takes into account the contrast between daylight and nighttime conditions and also the intermediate dawn and twilight effects on plankton volume. The adjusted volumes are then used in examining geographical and seasonal variations and for correlation with environmental factors.

The writer will be glad to provide a description of the method of adjustment if such is desired.

General Recommendations : It is our belief that most marine plankton research carried on by government agencies ordinarily pertains to one or more of the following general programs :

1. Studies of available fish food or relative productivity of different ocean areas.
2. Life history studies on commercially important fish or invertebrates.
3. Search for biological indicators to su ment hydrographic data for the id fication of water masses.

The more academic lines of research mu necessity be left to educational institution privately endowed laboratories.

These three research programs if effect prosecuted should provide information of value in the development and management of fis resources, whether in the Indo-Pacific, the ce Pacific, or elsewhere.

Although we believe there is much in favo the procedures which we have adopted, and we should like to see them in general use thro out the Pacific, we realize that they may not pr the desired information in many specialized prog of plankton research and the necessary fac may not always be available. We have found sampling method to combine well with other vities at sea and not to require an exorbitant am of vessel's time. Certain items of equipmen required, however, such as wire cable and a h duty winch, which may not be available o small research vessels. The displacement vo measurements and calculations are simple to and do not require elaborate laboratory equip

While the above-described equipment and cedures are not recommended as a standard consider that it is highly desirable to com quantitative plankton results from various areas and we have found that it is seldom po to do so. In many instances the results have comparative value if only a few additiona were recorded. It is therefore recommend the reporting of plankton results that :

1. The plankton collecting device be described, including especially the di sions and mesh apertures.
2. The method of hauling and stratu water sampled be given.
3. The quantity of water passing throug net be measured or estimated, wit method of measurement or estim fully reported, as well as the res data.
4. Replicate hauls be made whenever po employing the same gear and me in order to evaluate the sampling ability.

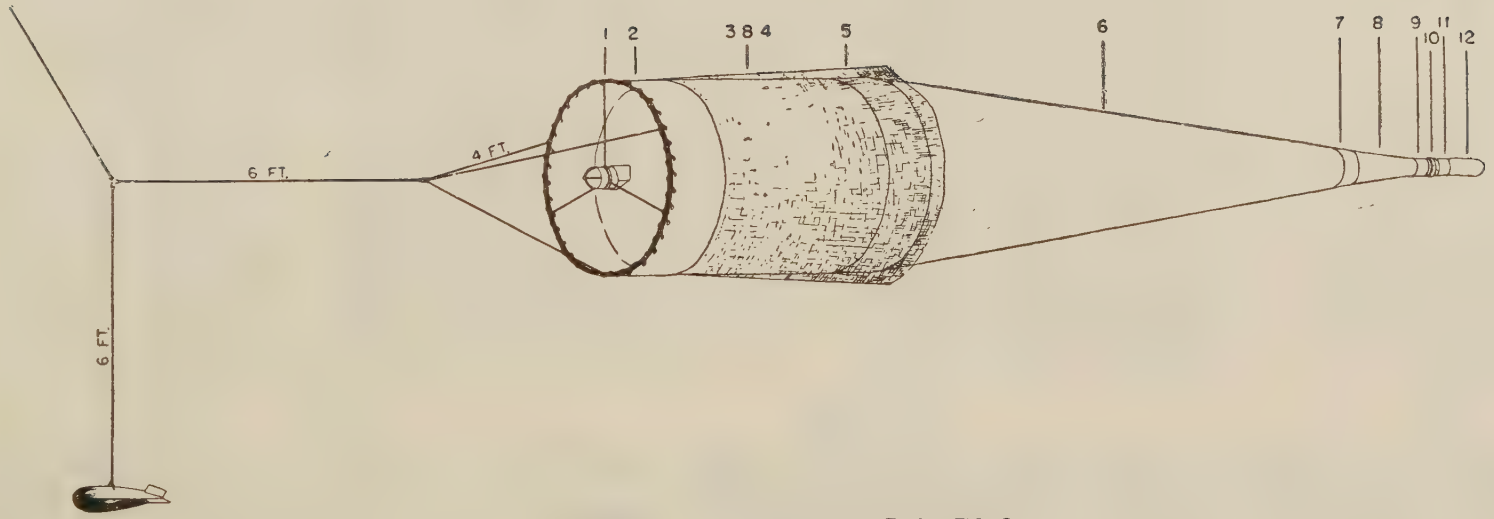
It would be desirable to encourage pla workers who have surplus collections in stor make known this fact, so that they might b tributed to investigators in other areas. laboratory has filled requests from several of the world for plankton materials from this of the Pacific.

Table 1. Suggested methods of collection and analysis for marine planktonological programs (Submitted by Dr. J. E. King)

Province	Form of Plankton	Collection		Analysis
		Gear	Manner of Use*	
Neritic	Nannoplankton	Water bottle (Nansen type) Water trap (Allen type)	Sample at 5 to 20m. depth	Centrifuging or settlement. Counts with micro-counting chamber.
	Phytoplankton	Water trap (Allen type) Clarke-Bumpus Sampler Tow net, 30 to 75cm.** (Nets of No. 20 silk bolting cloth)	Samples at 5 to 20m. depth. Horizontal hauls, surface to 50m. Oblique hauls, to surface or bottom to surface. Advise against surface samples only, and night hauls.	Centrifuging or settlement to obtain estimate of volume. Counts with Sedgewick-Rafter type chamber.
	Zooplankton	Clarke-Bumpus Sampler with 56XXX silk grit gauze net (aperture dia. 0.31mm.) Tow net, 50 or 100 cm.** of 30XXX silk grit gauze (aperture dia. 0.65mm.), equipped with flow meter.	Horizontal hauls surface to 100m. Oblique hauls, bottom to surface.	Counts with large chamber. Volumes by displacement method.
Oceanic	Nannoplankton	Water bottle (Nansen type) Water trap (Allen type)	Samples at 10 to 20m.	Centrifuging or settlement. Counts with micro-counting chamber.
	Phytoplankton	Water trap (Allen type) Clarke-Bumpus Sampler Tow net, 30 to 75cm.** (Nets of No. 20 silk bolting cloth)	Samples 10 at to 20m. Horizontal hauls, surface to 50m. Oblique hauls, 100m. to the surface. Advise against surface samples only, and night hauls.	Centrifuging or settlement to obtain estimate of volume. Counts with Sedgewick- Rafter type chamber.
	Zooplankton	Clarke-Bumpus Sampler with 56XXX silk grit gauze net. Tow net, 50 to 100 cm.**. of 30XXX silk grit gauze, equipped with flow meter.	Horizontal hauls, surface to 100m. Oblique hauls, 200m.	Counts with large counting chamber. Volumes by displacement method.
		High speed samplers	still experimental	

* Procedures suggested here are for general use ; modification would be necessary for many plankton studies with ecial objectives.

** We have found that the optimum amount of straining surface in plankton nets is provided by a length-of-net-ount-diameter ratio of 5 to 1.



DESCRIPTION OF PLANKTON NET SECTIONS

	1	2	3	4	5	6	7	8	9	10	11	12
MATERIAL	GALV IRON RING	12 OZ. CANVAS	30 XXX GRIT GAUGE	3/16" BAIT NETTING	10 OZ. CANVAS	30 XXX GRIT GAUGE	10 OZ. CANVAS	56 XXX GRIT GAUGE	10 OZ CANVAS	BUCKET COUPLING	10 OZ. CANVAS	56 XXX GRIT GAUGE
DIAMETER	39.4"	39.4"	39.4"	40"	39.4"	39.4" - 8"	8"	8"-4".	4"	4"	4"	4"
LENGTH	7/8" THICK	12"	38"	48"	10"	110"	3"	18"	2 1/2"	2 1/2"	2 1/2"	9"

Figure 1. Diagram and description of the 1-meter net used by the Pacific Oceanic Fishery Investigations, showing the general construction of the net and the method of attachment to the weight and towing lines.

he suggestions received from the members of Sub-Committee are summarized below :

ted States

) Neritic and Oceanic Nannoplankton-Collec- by Nansen bottle and Allen water trap. Analy- of catch by centrifuging and counts by micro- nting chamber.

) Neritic and Oceanic Phytoplankton-Collec- by Allen water trap, Clarke-Bumpus sampler tow net. Analysis by centrifuging and count- with Sedgwick counting rafter.

) Neritic and Oceanic Zooplankton-Collection he Clarke-Bumpus sampler and tow net. Analy- of catch by counts in large chamber and by the lacement methods.

tralia

) The Discovery type of nets has been recom- ded for general standardized method of collec-

ia—(IPFC/C52/Tech 37)

) Phytoplankton collection by Nansen and ella bottles and method of analysis expressing om intensity in terms of plant pigment units.

) Zooplankton collection by the Clarke-Bumpus pler with meter. Analysis of catch by the dis- ement method.

lippines

) Phytoplankton collection by Nansen bottle analysis of catch expressing diatom intensity he Harvey plant pigment unit.

) Zooplankton collection by the Clarke-Bumpus pler and tow net. Analysis of catch by the lacement method and by counts in large counting nber.

nasmuch as no further suggestions were re- ed from the other members of the Sub-Com- tee, no specific recommendations on standard hod could be made but this project of the Sub- mmittee will be continued and the suggestions ll concerned will be coordinated for the use ne Council as soon as possible.

. Suggestions for future work in planktonology :

) Studies of available fish food or relative pro- tivity of different ocean areas.

) Life history studies on commercially import- fish or invertebrates.

) Search for biological indicators to supple- t hydrographic data for identification.

) Taxonomic appraisal.

(e) Seasonal succession and deviation from such succession.

(f) Quantitative assessment.

(g) Geographic distribution (and incidentally indicator species).

(h) Biological correlation (i.e., with fish food chain components).

(i) Hydrological correlation (and plankton as a measure of productivity).

The Sub-Committee recommends that with the aid of all expert advice available the Council authorize a reliable authority or expert on Planktonology in the region to work out a handbook of field and laboratory practices in planktonology adaptable for the area.

It has been suggested that serious consideration be given by taxonomists in the area and by the Council to the preparation of identification leaflets similar to those published by the International Council.

The proceedings of the International Council for the Exploration of the Sea indicates that a special Sub-Committee has made studies on the standardization of methods for Zooplankton. This may be of help in the determination of the standardized method the IPFC may adopt for marine plankton.

6.24 Review of Contributions from Member Countries :

Australia :

1. E. J. Ferguson Wood—Phytoplankton Studies in Eastern Australia.
2. Miss P. Kott—Suggestions for Standardization of Plankton Collection and Problems for Future Work.

France : No Information

India :

1. Dr. Pannikar—IPFC/C52/Tech 37 Suggestions on Standardization of Methods in Quantitative Planktonological Investigations.
2. N. Dutta, J. C. Malhorta, & B. B. Bose—IPFC/C54/Sym 4 Hydrology and Seasonal Fluctuations of the Plankton in the Hooghly Estuary.

Indonesia :

1. Dr. K. F. Vaas—IPFC/C52/14D—Bibliography of the Literature Relating to the Indonesian Algae.

—Report for 1952 of the Sub-Committee on planktonology.

Japan :

1. S. Motoda—IPFC/C54/Sym 12 On Plankton Research in Japan with Annotated Bibliography.
2. T. Harada—IPFC/C54/Sym 5—Studies on the Blue-Green Algae of Japan.

Korea : No Information

Pakistan : No Information.

Philippines :

1. H. R. Rabanal—IPFC/C52/14D—List of Work on Plankton or with bearing on Plankton in the Philippines.

Thailand : No Information

U.K. (Malaya)

1. Tham Ah Kow—IPFC/C52/Tech 7—The Plankton Calendar of Singapore Straits With Suggestions for a Simplified Methodology for its Determination IPFC/C54/Sym 8—The Role of Planktonology in Fisheries Development.

U.S.A. :

1. J. E. King—Suggestions on the Standardization and Methods of Marine Plankton Collection and of Planktonological Programs Suitable for the Area.
2. U. S. Fish & Wildlife Service, Special Scientific Report—Zooplankton Volumes off the Pacific Coast, 1952.

Vietnam :

1. IPFC/C52/14D—Literature on Plankton of Indo-China—List of Zooplankton of Cambodia.
2. J. Blache—Notes and Observations on the Standardization of Plankton Collection.

7. Hydrology

The year 1953 was an important year for this Committee (Rapporteur, Mr. T. Megia, Philippines). After lengthy consideration at the 4th Meeting two main points emerged :

1. A request to Mr. P. Ch. Veen from Indonesia for making a survey of the existing oceanographic institutions within the central region which possess the necessary facilities for the analysis of water samples. (see item 24.1 in the Proceedings of the Manila Meetings).

   It was not found possible to fulfil this onerous assignment and moreover Mr. P. Ch. Veen left Indonesia in the m of 1953.
2. The attention of Member Governm was drawn to the desirabilit conducting estuarine and neritic h logical investigations and, fi Member Countries were request furnish papers for the next meeti the Council giving full details of hydrological programmes, incl wherever possible, descriptions of tical procedures and equipment.

Papers on Hydrology were presented a Eighth Pacific Science Congress at Manila by Pannikar and R. Jayraman, entitled : " Son pects of Productivity in Relation to Fisher Indian Neritic Waters," and by D. J. Rocl " Secular Hydrological Trends in Eastern Aus Coastal Waters ".

A paper with hydrological data from Phil waters will be presented at the 5th Meeting I.P.F.C.

For Indonesia it can be stated that es conditions have been taken up again for th time since the war both from a purely hydr standpoint as well as from a standpoint fisheries as such. This will be confirmed in This has become possible through the commis of a new research vessel *Samudera.*

Another main point of interest to the hy sub-committee was the proposal for an Pacific Oceanographical Institute. Strictly ing, this was an item considered by the Co a whole and not by the hydrology sub-com but it is of such an importance that a few lin be given here.

This proposal (see item 23 of the Mani ceedings) was forwarded by FAO to U and as a result a meeting of consultants wa prior to the 8th Pacific Science Congress.

As a result, the meeting considered s organization highly desirable and UNES FAO will now call at some time and place a meeting of accredited representatives of terested Governments to discuss financia bilities and, if necessary, to formulate an ag and rules of procedure for such an organiz

8. Seaweeds

The assignments to this Sub-Committe porteur, Mr. M. A. Abagon, Philippines be found in the Proceedings of the Manila Item 24.3 Nos. 6 and 7.

esolution C52/24.3(6) was implemented by the etariat for action by Member Governments of Council and the following replies have been ved.

urma

he Council is informed that the Government of Union of Burma is unable to furnish the requir- nformation as no research work in seaweed urces has yet been undertaken in the country.

ambodia

Ionsieur Dom-Saveun, Chef de Cantonnement Pêches, Phnom-Penh, informed the Council no basic studies on marine seaweeds have been ied out in the country. However, he believed some tangible results might be obtained if able technical assistance could be acquired to itate the studies concerning seaweeds; more icularly the localization and evaluation of the ding crop for purposes of industrial exploita-

n article written by Monsieur Dom-Saveun tled "Aperçu sur les resources d'algues maritimes du Cambodge" has been circulated as an Occasional Paper of the Council. The Sub-Committee regrets to state at this moment its inability to affix the scientific names of the accompanying mounted specimens of Monsieur Dom-Saveun. All the seaweeds described by Monsieur Dom-Saveun except the Sargassum are excellent supplementary feeds for *Chanos chanos* Forskål.

Ceylon

The survey of the seaweed resources in Ceylon is conducted by the Fisheries Research Station. It is done with the help of a small boat or motor launch. A stretch of coast of about 5 miles is selected and the survey is carried out during low tide. Several plots 15 feet by 15 feet are selected at random to a depth of five feet and all the algae in the area are collected by a collector. The weeds are dried for 3 to 4 days and their weight determined.

Philippines

The economic seaweeds mentioned in the paper of Dr. Zaneveld are mostly found in Philippine waters. The following seaweeds have so far earned vernacular names among the inhabitants:

Scientific name	Vernacular name	Economic use
1. *Acanthopora orientalis*	*Culot* (*Ilocano, Luzon*)	Human food
2. *Caulerpa serrulata*	*Galgalacgac* (Ilocano, Luzon)	,, ,,
3. *Caulerpa sertularoidea*	*Salsalamugui* (id. id.)	,, ,,
4. *Caulerpa recemosa var. uvifera*	*Ararusip* (id. id.)	,, ,,
5. *Chaetomorpha crassa*	*Cawat-cawat* (id. id.)	,, ,,
6. *Codium tenue*	*Pukpuklo* (id. id.)	,, ,,
7. *Digenea simplex*	*Bodobodo* (id. id.)	Anthelmintic
8. *Enteromorpha intestinalis*	*Bitukang-manok* (Tagalog, Luzon)	Human food
9. *Eucheuma spinosum*	*Rupruppuuc* (Ilocano Luzon)	,, ,,
10. *Gracilaria confervoides*	*Gulaman dagat* (Tagalog, Luzon)	,, ,,
11. *Gracilaria crassa*	*Susueldot baybay* (Ilocano, Luzon)	,, ,,
12. *Gracilaria eucheumoides*	*Canot canot* (Ilocano, Luzon)	,, ,,
13. *Gracilaria lichenoides*	*Gargararao* (,, ,,)	,, ,,
14. *Hydroclathrus cancellatus*	*Balbalulang* (,, ,,)	,, ,,
15. *Liagora cheyneana*	*Barisbaris* (,, ,,)	,, ,,

The following Philippine seaweeds of economic importance that are not mentioned in the paper are:

Scientific name	Vernacular name	Economic use
1. *Porphyra spp.*	*Gamet* (Ilocana)	Human Food
2. *Digenea simplex*	*Bodobodo*	Anthelmintic
3. *Polysiphonia spp.*	Unknown	Fish Food
4. Ectocarpus spp.	Unknown	Fish Food
5. Lynbya aestuarii	Lablab (Tagalog)	Food of *Chanos chanos*

Jnited States and Territories

Dr. A. V. Anderson, Chief, Branch of Commer- Fisheries, U.S. Department of the Interior h and Wildlife Service, states that investigations he United States and its territories of seaweed resources have no immediate application to the tropical conditions of the Indo-Pacific Area. However, he writes that G. A. Riley and G. L. Clarke could be consulted on matters pertaining to quantitative ecology and dynamics of production of both plankton and benthos flora, respectively.

United Kingdom Territories —Singapore

No research workers are engaged in the study of seaweeds in the Colony. However, some seaweeds of economic importance are recognised, as follows :

1. *Ulva latissima*
2. *Splanchnidium* spp.
3. *Girartina* spp.
4. *Caulerpa macrodisca*
5. *Caulerpa fergusonii*
6. *Sargassum* spp.

Numbers 1 to 5 of the list above are seaweeds that are used by the inhabitants to feed ducks and pigs, while numbers 2 to 5 are seaweeds that are utilized for human consumption.

Institute of Seaweed Research (Scotland)

In a letter of Dr. F. H. Woodward, Director of the Institute of Seaweed Research, Scotland, to the Secretariat, it was stated that reliable methods of surveying non-buoyant varieties of sub-littoral brown marine algae, based on aerial photography and mechanical quadrat sampling have been, or are being used, to assess the seaweed resources of Eastern Canada, Greenland, Iceland, Norway and Scotland. Quantitative surveys of the more prolific buoyant varieties have also been made on the Pacific coast of the United States of America and Canada and along the shorelines of the Falkland Islands, Australia and New Zealand.

A description of recent developments in the methods used for the localization and evaluating the standing crop of seaweeds in their natural habitat by Dr. F. H. Woodward, is quoted below :

" In Scotland, where the bulk of Britain's seaweed is found, the problems were many and difficult.

" A reasonably clear idea of the localization of the principal beds had first to be obtained. This was not easy, but examination of Admiralty charts eliminated areas with sandy or muddy seabeds, which will not grow seaweed. The next step was to find beaches on which sub-littoral weeds were thrown up by wind or storms. This necessitated weekly observations during the winter of over 30 beaches, mostly in Orkney, the Hebrides, and the Scottish west coast. As a result it was found that the inshore waters of the Orkneys and South Uist in the Hebrides probably support a bigger growth of the Laminariales than any other area off the coast of Britain, and the first serious attempt to determine the quantities and types of submerged seaweed was consequently centred on the Orkney Islands.

" The limits of the beds in this area as seen from an aeroplane were sketched on charts and the task of estimating tonnages and types of sea begun. A survey boat examined the subm seaweed through a view box, and having de that the bed contained sufficient seaweed o right type and defined its limits, the task of a ing the growth density commenced.

" This was done by sampling the bed w specially designed grab over half-square yard at intervals, each sample being hauled up, we and subdivided into the various types of weed sent. By this means the entire bed was co and the resulting data, when plotted on a ma analyzed statistically, enabled an exact esti to be made of the amount and type of weed gr in it.

" This work was carried on for over two in Orkney during which time the grab was lo and raised over 20.000 times. It was found between low water mark and seven fathoms i Orkneys there were 1.200.000 tons of sea growing.

" *Aerial Survey Methods.* While this was in progress efforts were made in collabo with the R.A.F. to develop an easier meth survey based on aerial photography. Durin war improved photographic techniques had devised which enabled the seabed to be photog ed in detail from fast-moving planes, reasonably high, and it was found that these niques could be modified to record in detail merged seaweed beds in inshore waters. was a tremendous step forward and even saved years of laborious and expensive boat for as soon as the coastal areas had been photog ed most of the initial survey work could be c out on the profiles so obtained with relativel random boat samplings.

" Although the survey of the Scottish sea beds is not yet complete, sufficient has been to indicate that the 4,500 miles of Scottish c waters contain total seaweed resources of 10.000.000 tons, equivalent to a potential a harvest of about 1.000.000 tons of seaweed allowance has been made for inaccessible bed a four-year recovery period.

" Although no survey as accurate as thi been made elsewhere, sufficient has been do be certain that there are at least 60 million to seaweed growing along the coastlines of No France, the British Isles, Canada, the U.S.A the Falkland Islands."

In the light of the foregoing consideration suggested that a similar study of the seawe sources by every member country of the C be carried out using as a pattern the methods u

the Scottish Institute of Seaweed Research, in ar as they are applicable to tropical conditions.

General Biology

he assignment to this Sub-Committee at the Meeting (item 24.3 (1)), Proceedings) limited field primarily to Crustaceans and Molluscs.

report was received from the Rapporteur, J. S. Domantay, as follows :—

The crustacean fisheries in general and the wn (shrimp) fisheries in particular of the Indo-ific areas constitute one of the minor marine ustries, which if properly exploited and develop-may be considered one of the major resources. the Philippines the seas, rivers and mangrove mps are being exploited for this particular atic resource. Fishponds are being stocked n the fry of *Penaeus monodon* taken from other es. There are over a dozen species of crus-ans that are being fished out and cultured for mmercial purposes. Gears commonly used to h the shrimps are the scissor net or drag net ed *sakag*, small seine used in mouth of rivers, ular beach seine made of abaca to catch schools tiny shrimps called *alamang* composed mostly young or adult Palaemon, corral or *baclad* and mechanized trawling net used in the sea with a dy-muddy bottom.

Mr. Tham Ah Kow, Fishery Officer of the leration of Malaya and Singapore reported in paper entitled " The Shrimp Industry of gapore " on some 20 species of crustaceans ght by push nets, beach seines and from prawn ds. Mangrove swamps are fast being converted prawn ponds apparently in the same pattern the fishponds in the Philippines. Refer to C/C54/Tech. 16.

Dr. N. Ahmad, Deputy Director of Fisheries, nilla, East Bengal, Pakistan reported 9 species rustaceans in his paper entitled " Prawn Fishery East Pakistan " (IPFC/C54/Tech 15) which caught by drag and seine nets, trawl net, se net, stake net, framed or dip net, cast net by traps. This paper gives a good account of prawn fisheries of East Pakistan which are nd everywhere in tanks, *beels*, *Khals*, estuaries l the foreshore, usually caught by nets and traps. e prawn fisheries of West Pakistan are similar these of East Pakistan as regards methods of hing and marketing. There are no statistical a with respect to the volume of catch.

Mr. Krishna Menon of the Prawn Research Unit he Central Marine Fisheries Research Station, akkal, although he did not report on the status he fisheries, has listed 22 papers on the biblio-graphy of the Indian Crustacean Fisheries. Another 6 papers were added to the list which is being given separately. From this bibliography one can infer that extensive work has been done on the prawn (shrimp) fisheries of that particular area.

The paper on the " Reproduction, Development and Rearing of *Penaeus japonicus* Bate " by Motosaku Fujinaga of the Fisheries Agency of the Japanese Government suggests that the crustacean fisheries are not altogether neglected if not fully developed in Japan. Unfortunately no report has been given on the actual status of the prawn (shrimp) fisheries.

The Grapsoid Crabs of the Malayan Mangrove Swamps by M. W. F. Tweedie, Director, Raffles Museum of Singapore (presented at this Meeting as IPFC/C54/Tech 14) is a very valuable contribution to the systematic study of crabs in the Indo-Pacific mangrove swamps. No report on the status of the prawn (shrimp) fisheries has however been included apparently due to absence of statistical data.

The other Indo-Pacific countries with the exception of the United States of America apparently have no records on their crustacean fisheries. According to reliable information, the people of Indonesia have also exploited the prawn (shrimp) resources of the different islands of the Republic using local methods with gears mostly of primitive types. Like the Philippines and other neighbouring countries prawns or shrimps occupy a prominent place in this fishery, the dried products constituting an important item of international trade.

10. Taxonomy

The most important assignment to this Sub-committee (Rapporteur, Dr. J. D. F. Hardenberg, Indonesia) was the preparation of a publication on the 15 most important groups of fishes in the area. Work has proceeded on this.

A further report concerning this Sub-Committee was received from Australia by Mr. I. S. R. Munro, which is given below :

1. The Australian Government through its Department of External Affairs is sponsoring the preparation and publication of a handbook of the fishes of Ceylon. Costs are being met by the Australian Government from funds available under the Colombo Plan. The author is I. S. R. Munro and it is expected that the manuscript will go to the printer early in 1954. About 850 species will be included, many of which are common to most of the Indo-Pacific countries. The handbook will provide keys to all species together with a brief

description and an illustration of every species. Several member countries and the I.P.F.C. have indicated their interest in this handbook, copies of which will be distributed in most Indo-Pacific countries in addition to Ceylon.

2. The Department of External Territories in conjunction with the Division of Fisheries, C.S.I.R.O., is preparing for publication a handbook of the fishes of New Guinea. The author is A. M. Rapson and the manuscript should be ready perhaps late in 1954. The handbook will be based primarily on the fish collected by F. R. V. *Fairwind* in the waters of the Australian Trust-Territory of Papua and New Guinea and will feature descriptions and illustrations of the principal species of that region.

3. The Division of Fisheries, C.S.I.R.O., has now almost ready a complete check-list of the fish fauna of New Guinea, including Australian, British and Dutch territories embracing New G Waigeu, Misool, Bismarck and Admiralty I and Solomon Islands. The list is fully ann with references and locality records relevant area. The compilation has been complete is now being typed in a form suitable for publi It has been prepared by I. S. R. Munro a by Mrs. M. Jones. It is suggested here th might be offered to the I.P.F.C. for consid as an occasional publication of the Council. Division would be interested in the views Taxonomy Sub-Committee in this regar whether the Council is likely to have funds av for its publication in printed form.

News was received from Dr. K. S. Mis he is preparing a key of common commercial of India and Pakistan, to be published in the R of the Indian Museum, with up to date sc names and suitable illustrations.

APPENDIX I

WEED ERADICATION LIST OF REFERENCES*

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REPORT OF TECHNICAL COMMITTEE II TO THE 5th MEETING

INTRODUCTION

The activities of the Committee since the 4th Meeting consisted mainly of initiating action in accordance with the recommendation of the Council at its 4th Meeting. Owing to preoccupation of fisheries workers in their own countries, progress was not very appreciable. Members of the Committee have not, therefore, been able to devote as much time to the work of this Committee as the problems necessitate.

Progress during the year is summarised below :—

(1) Craft and Gear

1.1 *Gear Classification*

Little progress has been made on assignment 25.1 concerning *gear classification*. In addition to the scheme by Burdon, presented at the 3rd Meeting and the paper on an outline classification for Korea, presented at the 4th Meeting, a paper giving a classification of fishing gear and methods in Japan will be presented at the 5th Meeting. In connection with the preparation of Vol. II of the Handbook series (see IPFC/5/47/Appendix) a classification scheme of fishing gear is also in preparation in Section 3.

1.2 *Preservation of Fishing Gear*

In response to the questionnaire sent out on *Current Methods of Preservation of Fishing* (assignment 25.1 (4)), information has been re from Australia, Cambodia, the States of from East and West Pakistan and Sarawak. materials used in gear making are mostly and hemp or ramie. After use the gear is universally washed in water, usually fresh and dried in the sun, rarely in the shade. In Pakistan the gear is usually washed in br water to which a 15-20% solution of quicklim been added to aid in cutting and loosenin adhering slime. In Cambodia, the gear is imm in boiled lime water first, to make the supple.

Fishing gear used in fresh water only often r no other treatment, even when new. This case in most of the inland States of India. Th is said to have a life of 3-4 months in some and up to 1-2 years in others, depending up amount of usage.

To prolong the life of fishing gear, esp those used in brackish and salt water, a prese treatment is usually given, especially when th is new, most commonly by tanning. The t solution or cutch is obtained from the bar variety of trees depending on the locality.

1. SOURCES OF CUTCH FOR TANNING (" DYEING ") OF GEAR

Country or State	Local name of treatment	Trees from which bark is utilized		Used f
		Local name	Scientific name	
Australia	..	" wattle bark "	..	
Cambodia	..	smach	Melaleuca leucadendron	large nets
		cha	Butea superba	small nets, lines
Himachal Pradesh	wagal	shembi	Acacia pinnata	
		ain	Terminalia tomantosa	
India Bhopal	kus	Babul	Acacia arabica	
		Tinsa	Dugeinia dalbergro ides	
		Jaman	Eugenia Tambolann	
		Koha	Terminalia arjuna	
		Tendu	Diospyres melanoxylon	
Hyderabad	..	Babool-Kichal	Acacia arabica	
Saurashtra	Lal Rangvi	Kanari Chal (Sajad Chal)	Teminalia tomentosa	
Tripura	Gabsesh	Gab		
	Garmrash	Garon		
Uttar Pradesh	Rangai	Lahi		
		Babool-Kichal	Acacia arabica	
Orissa	Chali	Sunari	Acacia fishtula	
Patrala & E. Punjab		Kikar	Acacia arabica	
Madhya Bharat	Rangna	Katha (wood)	Acacia arabica	

Country or State	Local name of treatment	Trees from which bark is utilized		Used for
		Local name	Scientific name	
		Babul-Kichal (bark)	Acacia catechu	
		Bhalawa		
		Tendu-Kichal (bark & fruit)		
dras	Pattai-bark	Panachi Kai (fruit)	Diospyros embryopteris	
		Palapattai	Acacia arabica	
		Karuvelampattai		
		Nellipattai	Phyllanthis emblica	lines
		Kattevazhai		
		Othiampattai	Odona Wodiyai	cast nets
Bengal		Garanchhal	Gerrops rexburghiana	
		Gab	Decinox regia	
vancore-Cochin	Uthimukkal (tanning)	Panachikka		
	arikkuen	Kalasham	Odina Wodiyai	
		Kadukka	,, ,,	
	Puzhunguha (heating or boiling)	Puncha	Terminalia chebula	
		Uthi	Ecemna latifolia	
		Munja (leaves)		
Pakistan		Gab (fruit & leaves)	Diospyros embryopteris	
Pakistan		Goram (catechu & allied speeres)	Ceroops roxburghiana Acacia catechu	
awak		Tengar	Criops tagal	
		Bakau minyak	Rhizophora conjugata	

n some cases leaves from certain trees are used, even the seed shells of tamarind, rice paste h cocoanut juice and the use of cow dung are ntioned in one report.

he bark is usually ground fine and allowed to k in water for several days or boiled in water for ½ to 2 hrs. to speed up the extraction. A combination of the two may be used, as in West Bengal where the bark is allowed to soak in the water overnight, which is then boiled for 1 hour and left to stand overnight again. The proportions of bark and water vary widely in different areas.

2. STRENGTH OF TANNING SOLUTIONS

Country or State	Bark	Water	Time of Extraction	Temp. °C.
Australia	1 lb.	1 gal.		
Cambodia	1 part	2 parts	soaked	ordinary
India Himachal Pradesh	1 maund	15-20 Gals.	4 days	ordinary
			or 4 hrs.	boiling
,, Bhopal	3 lbs.	4 lbs.	½ hr.	,,
,, Hyderabad	1 lb.	5 lbs.		,,
,, Saurashtra	1 lb. (Kanari)	1 gal.	7 days	30°C
	10 lbs. (Sajad)	1 gal.	or 2 hrs.	boiling
,, Tripura	1 part	1 part		,,
,, Pradesh	1 part	15-20 parts	1-2 hrs.	,,
,, Patiala & ,, East Punjab	1 part	10 parts	½ hr.	,,
,, Madhya Bharat	2 oz.	1 seer		,,
,, Madras	10-15 lbs.	8-12 gals.		,,
,, West Bengal	80 lbs.	22 gals.	overnight	ordinary
			1 hr.	boiling
			overnight	ordinary
,, Cochin-Travancore	10-15 lbs.	6-8 cub. ft.		boiling
Sarawak	500-600 lbs.	135 gals.	1 week	ordinary

A lighter tanning solution is said to penetrate better, although the tanning action is slower. The tanning procedure varies also in different countries and States, depending on the strength of the solution the size of the nets, i.e. the gear may be immersed in the solution only once, when new, or at regular intervals during the fishing season, o treatment may involve two to three imme with intermittent drying, and the immersio be done in cold or hot tanning solutions. I cases the bark paste is rubbed directly on th

3. METHOD OF CUTCH TREATMENT OF GEAR

Country or State	Temperature of Cutch Solution °C	Length of Immersion	Number of immersions per treatment (intermittent drying)	Frequency of Treatment	Av life
Australia	100	30 min. allowed to cool for 24 hrs.; subsequent immersions 5-10 min.		As often as necessary	incre
Cambodia	hot or cold		Several times for 3-4 days in succession	When necessary	life inc
India Himachal Pradesh	100	15 min.	3	Twice/month	
Bhopal	29-38	10 min.	1	Twice/month	2 ye
Hyderabad	..	1 hr.	2	Twice/year	3
Saurashtra	33	5 min.		Twice/month)	2-3
(Kanari) (Sajad)	50-60	10-15 min.	3	Once/month)	
Tropura	ordinary	1 hr.	1	Twice-3 times per year	
Orissa	24-32	overnight depending on size of net	2	Every 3 months	
Uttar Pradesh	ordinary		2	Once/year	2-5
Patiala and East Punjab	ordinary	..	1	Only when new	addi
Madhya Bharat	100	until solution lost its color	1	Only when new	3 1½ y
Madras		1 hr.	1	Once/week	
Bengal	cold + hot	overnight 2 hrs.	2-3	Twice/month	3-4
Travancore-Cochin		30-60 min. (2-4 hrs. for large nets)	1 rarely 2	Twice/month	3-4
Pakistan East	luke warm	..	..	Every 3 months	
Pakistan West	..	dopped	3+	Twice/month	
Sarawak	cold +steamed	soaked ½ hr.	3+ after 6 soakings (new)	Every 3 weeks	1 y

New nets require, as a rule, more immersions n old ones, but they dry quicker. Thorough ying is important to get an even color.

Other preservatives used are mainly Coal tar, Creosote and Copper salts.

Country or State	Coal tar	Creosote	Copper salts
Australia	Tar mixed with benzol to suit; applied cold, or tar applied immediately after tanning or combined with cutch (4 gals. tar + 50 gals. tanning solution), ½ hr. at 100°.	At ordinary temperature after tanning, washing and drying	New net boiled in water, immersed in "Dekkol" allowed to drain, then dried in shade.
India Himachal Pradesh			Curpinol experiments satisfactory
Madras			Copperoleate
West Bengal	for gear used in brackish and salt water		Copper nephenate experiments satisfactory
East Pakistan	Steam heated with Kerosene in proportion 85:15 applied boiling hot for 2-3 min. once. Repeat every six months		
Sarawak		Experiments in progress	

The treated gear should be used as soon as pos- le. If held in dry storage too long, the fibres ll deteriorate. For this reason no treatment is ually given at the end of the fishing season, in t the preservative is usually washed out before gear is dried for storing away except in some ntries, e.g., Australia.

The tanning treatment imparts a dark brown or to the gear; the penetration of the preservative nearly or fully complete; little or no shrinkage urs and only a slight increase in weight. The ated gear may lose some of its elasticity and ibility, but retains its strength and is easily ndled.

In practically all cases the barks are gathered by fishermen themselves and they do their own ning, so that the cost is not great.

Most of the answers to the questionnaires listed types of gear used in the area, the material of ich each type is made, the length of time the r types are immersed in water, hours per day, s per month, length of fishing seasons and the cies of fish caught with each type of gear, thus ing considerable additional information in each e.

Non-indigenous Gear

A report has also been received from India on introduction, in 1951, of non-indigenous gear—ertrawl nets, 175 feet in length—in the coastal ters of the States of Bombay and Saurashtra by the Japanese trawler *Taiyo Maru*, No. 17. The gear is used throughout the year irrespective of seasons, in 30-60 fathom water.

In the Bay of Bengal trawl nets to fish herring, haddock and prawn were introduced by Danish fishery experts since 1950. They fished throughout the year up to 285 nautical miles from their home-ports, in water of 5 to 32 fathoms. Mackerel driftnets and floating trawls were less successful.

1.4 *Fishing Craft*

During the recent FAO Fishing Boat Congress in Paris and Miami (U.S.A.) three papers of particular interest to the Region were presented: Fishing Craft, by Dr. M. R. Qureshi, H. Maguusson and J. O. Traung, No. 19 Bombay Fisherman forges ahead, by Dr. S. B. Setna and No. 27 Beach Landing Craft used for fishing in Europe, by H. K. Zimmer.

Other papers of interest covered the motorization of small fishing boats in Chile, and the field of engines (semi-Diesel and Diesel) and deck equipment (winches), etc.

A condensed version of all 68 papers and the discussions they provoked at the two meetings will be published in book form (in English) in 1954.

2. Food Technology

The main assignment of the Committee was to collect material for the preparation of handbooks on Food Technology and Processing of Fish. The

matter was referred to the Fisheries Division F.A.O. Dr. G. L. Kesteven, the General Editor of the Handbook Series, expressed his views as contained in IPFC/C54/6. It is recommended that the prospectus for this handbook, as indicated in this paper, may be studied by the Committee this year and the views communicated to the Council for final consideration.

3. **Socio-Economics**

The Council recognized that priority in the socio-economic field should be given to the improvement of marketing ; the initial efforts should be exerted towards group formation (including Co-operatives) to handle the marketing activities, with credit functions to be initiated, financed and supervised by the Government ; provided, however, that the Government withdraws gradually from this undertaking as the industry indicates its capability to take over. For effective operation of this project, the Secretariat was asked to contact F.A.O. or other bodies to determine whether a marketing specialist could be provided.

Informally it is known to the Committee that F.A.O. has not been able to provide a marketing specialist for the region. Other information received from Member Governments is summarised below :—

U.S.A. :

Senate Bill No. 1731, 83rd Congress, 1st session, read twice and referred to the Committee on Interstate and Foreign Commerce, seeks to make available to the Secretary of the Interior funds for conducting a fishery educational service and technological research programs.

Japan :

Information on (a) Fisheries Reform (carried out after the war), (b) Fisheries markets (Organization & functions) and (c) Fisheries Finances of Japan, are expected to be received from the Fisheries Agency. Mention may also be made of " Some Important Socio-economic Problems of the Fisheries of Japan ".

Pakistan :

Mention has been made of certain projects concerning the betterment of fishermen presently under consideration of the Go ment.

Philippines :

Bill No. 3694, entitled, An Act to Esta a Central Fish Exchange, filed in the H of Representatives during the 4th sessi the Second Congress of the Republic Philippines. The Bill provides for creation of a Central Fish Exchange poration.

India :

Papers received for the 5th Meeting.

(a) " Problems of Fish Marketing i State of Orissa " by G. N. Mitra

(b) " A Note on the Marketing and P vation of Fish in Saurashtra " by Srivatsa.

Viet-Nam :

Some Co-operative societies for fish have been formed, receiving aid fro Government for :

(a) Extending the range of fishing by anizing the boats.

(b) Construction of fishing boats, and

(c) Provision of monetary help in the of loans for stabilizing the fis dustry.

4. **Statistics**

Papers received for the 5th Meeting.

Pakistan :

(i) Statistics relating to Fisheries i Karachi Area in 1951.

(ii) " Fish Trade in Pakistan ", by Qureshi & Moinuddin Ahmed.

Philippines :

" Fisheries Statistics of the Philippines, by Jose R. Montilla & C. R. Dimon.

The paper is for discussion by the Com in order to estimate the staff and other equi which may be necessary for the collection data outlined in the paper (IPFC/C54/CP1

LIST OF DOCUMENTS ISSUED

RKING PAPERS :—

C/C54/ 1 Provisional Agenda for Council's fifth Meeting
1 rev. 1 Revised Provisional Agenda for Council's fifth Meeting
2 Report of the Executive Committee to the 5th Council Meeting for the period 1952-54
2A Secretariat review of Documentation at Meeting
3 Memorandum from General Fisheries Council for the Mediterranean on Fishing with Lights
4 Draft Curriculum of lectures for Hong Kong Marketing Centre
5 Handbook on the Culture of warm-water fishes—Revised synopsis—Fish Culture in the Indo-Pacific Region
6 Handbooks on Food Technology & Food Processing—Resolutions C52/17(2) & (3)
7 IPFC Fishery Handbooks—Report by General Editor
8 Report of Technical Committee I to the 5th Meeting
9 Secretary's Report on Credentials
10 Technical Committee I (Panel on Inland Fisheries)—Government of India request for an opinion
11 Report of Technical Committee II to the 5th Meeting
12 Statement communicated by the Fisheries Division, FAO, in connection with a proposed survey of world fishery resources
13 Report on Assignment Note 1
13 rev. 1 Amendment
14 Panels of experts of Committee II
15 Technical Committee I—Report on Technical Papers
16 Technical Committee II—Report on Technical Papers
17 Report of Working Party No 5 to examine Executive Committee Report
18 Panel of experts of Committee I
19 Report of Plankton Symposium
20 Report of the Working Group Appointed Under Assignment Note No. 4 (Publication & Bibliography)
21 Report of Working Group No. 3 to examine Technical Assistance Programmes
22 Report of Technical Committee I
23 Report of Technical Committee II
24 Report of Technical Committee I on Working Paper IPFC/C54/12
24 Rev. I Ditto (revised)
25 Report of Technical Committee I on Assignment Note No. 14
26 Report to Technical Committees I & II on the submission of Thai Fisheries problems by the Thai Delegation
27 Report of the Committee on Resolutions—Working Group on Assignment Note 2
28 Report of Technical Committees I & II on Assignment Note 14

CHNICAL PAPERS :—For abstracts see " IPFC Abstracts of Technical & Symposium Papers—5th Meeting "

Inland Fisheries

C/C54/Tech 1 Chinese Systems of Pond Stocking, by S. Y. Lin
Tech 2 A Comparative Study on Coarse Darak and Corn Meal as feed for Bañgos fingerlings, by P. G. Padlan & H. R. Montalban
Tech 3 The Role of pH in Pond Fertilization, by D. V. Villadolid, P. Panganiban and T. G. Megia
Tech 4 Do Chinese Carps spawn in Japanese waters ? by K. Kuronuma
Tech 5 On the Paddy Field Prawn Fishery of Travancore-Cochin and an experiment in Prawn Culture, by M. K. Menon
Tech 6 On Water Hyacinth and its control in Fish Ponds, by N. Ahmad
Tech 7 Apercu general sur la migration et la reproduction des poissons d' eau douce du Cambodge, par Sao-Leang et Dom-Saveun
Tech 8 Note on the Occurrence of Chanos Fry in Thailand, by J. Thiemmedh
Tech 9 Pisciculture au Vietnam, par Cao Thien Buu
Tech 10 Contribution a l'Etude sur la densite optimum de pleuplement et les associations d'especes compatibles, par Ngyuen Nhu Nghi

Marine Fisheries

Tech 11 Fisheries of the Sind Coast, by M. R. Qureshi
Tech 12 The Neritic-Pelagic Fisheries of Japan
Tech 13 Recent Studies on the Distribution and Migration of Tunas and Related Fishes in Japan, by H. Nakamura

General Biology & Hydrology

Tech 14 The Grapsoid Crabs of the Malayan Mangrove Swamps, by M. W. F. Tweedie.
Tech 15 Prawn Fishery of East Pakistan, by N. Ahmad
Tech 16 The Shrimp Industry of Singapore, by Tham Ah Kow

D. **Taxonomy**

TECH 17 (withdrawn) A plea for an international approach to a taxonomic study of freshwater fi South East Asia (Oriental Region), by S. L. Hora

E. **Gear Technology**

TECH 18 The Efficacy of some Net Preservatives on Cotton Twines, by J. I. Sulit and P. Panganiban
TECH 19 The Classification of Fishing Gear and Methods in Japan, by S. Takayama
TECH 20 Fishing Craft of East Pakistan, by N. Ahmad
TECH 21 Fishing Craft and Tackle of Saurashtra, by K. R. Srivatsa
TECH 22 Trawl Fishing in Indian Seas from 1948 to 1953, by K. Chidambaram
TECH 23 (Abstract only) Preliminary results of fish detection by echo sounding equipment in the G Thailand, by T. Bamrajarinpai & M. J. Lobell
TECH 24 (Abstract only) Experimental fishing with " Otoshi-ami " in Thailand, by S. Charoenphol & Lobell
TECH 25 (withdrawn) Experiments with small inshore fish pots, *Babu*, at the marine fisheries by P. Rodphothong
TECH 26 (withdrawn) Shark fishing with longlines in Thailand, by S. Charoenphol & M. J. Lobe

F. **Food Technology**

TECH 27 Situation de l'industrie du poisson sec au Cambodge, par Dom-Saveun
TECH 28 Valeur alimentaire des sauces de poisson, par R. Lafont
TECH 28 (Eng.) On the Food Value of Fish Sauces, by R. Lafont
TECH 29 The Relation between the Fish Landings and the Refrigeration Industry in Japan, by S. Wa
TECH 30 (Abstract only) A new industry for Thailand, by B. Indrambarya & M. J. Lobell
TECH 31 (withdrawn) Design, operation and economics of a simple reduction plant designed for villages by S. Charoenphol, S. Ruamraksa & M. J. Lobell
TECH 32 (withdrawn) Utilization of sea mussel resources of the gulf of Thailand, by S. Charo S. Ruamraksa & M. J. Lobell
TECH 33 (withdrawn) Manufacture of pressed salt fish in Thailand, by S. Charoenphol, S. Rua & M. J. Lobell

G. **Statistics**

TECH 34 Sampling Methods used in Japan Fisheries Catch Statistics, by T. Yamamoto
TECH 35 On the Inshore Fish Population of the Straits of Singapore, by D. W. LeMare and Tham A

H. **General**

TECH 36 Fisheries Radio Network in Japan, by K. Kimura
TECH 37 Etude sur la commercialisation des Produits de la Peche maritime par Tran-Van-Tri et P. G
TECH 38 Fisheries Educational Schemes in Japan, by S. Konda
TECH 39 Sound production by Marine Fishes, by M. P. Fish
TECH 40 Investigations on the racial characteristics and biology of the Hilsa of the Hooghly River, by T Pillay
TECH 41 On occurrence of Chanos fry in Indonesian Waters, by H. Saanin

SYMPOSIUM PAPERS :—

I. **Plankton—Co-sponsored by UNESCO**

IPFC/C54/SYM 1 On the methodology of marine plankton collection, with a suggested classification, by Z. Na
SYM 2 On the nutritional relationships between plankton and fish in Indonesian freshwater ponds, b Vaas
SYM 3 Some factors controlling algal production in salt water lagoons, by V. K. Pillai
SYM 4 Hydrology and seasonal fluctuations of the plankton in the Hooghly estuary, by N. Dutta Malhotra and B. B. Bose
SYM 5 Studies on the blue-green algae in Japan, by T. Harada
SYM 6 Observations on the distribution and fluctuations of planktonic larvae off Mandapam, by R. R
SYM 7 A preliminary study of the plankton of the Chilka Lake for the years 1950 & 1951, by M. F sundaram and J. C. Roy
SYM 8 The role of planktonology in fisheries development by Tham Ah Kow
SYM 9 A preliminary study of the hydrology and fauna of the Vellar estuary (South Arcot Dt., S by K. Ramamurthi
SYM 10 Variations in zooplankton abundance in the Central Equatorial Pacific, 1950-1952, by J.
SYM 11 Feeding habits of the pond-smelt, *Hypomesus olidus* and the plankton succession in Lak by Y. Shiraishi
SYM 12 On plankton research in Japan with an annotated bibliography, by S. Motoda
SYM 13 On the plankton of three freshwater fish ponds in Madras city, India, by P. I. Cha B. Krishnamurthy
SYM 14 On carp fry mortality in nursery ponds and the Role of Plankton in their survival & growth, b Alikunhi, H. Chaudhuri and V. Ramachandran

SYM 15 Preliminary observations on the Biology of Boreo-Arctic and Subtropical oceanic zooplankton populations, by C. J. Fish
SYM 16 Notes on the Utilization of Zooplankton for Food in Thailand, by S. W. Ling and M. C. Kosol Suriyong
SYM 17 Tropical Freshwater Plankton, by Professor A. Thienemann

:—IPFC/C54/Tech 3—" The Role of pH in pond fertilization " should also be considered here.

Marketing

C/C54/SYM II-1 Some Important Socio-economic Problems of the Fishery Industries of Japan, by N. Oka, I. Konuma, K. Yamamoto and M. Abe
SYM II-2 Problems of Fish Marketing in the State of Orissa, by G. N. Mitra
SYM II-3 A Note on Marketing and Preservation of Fish in Saurashtra, by K. R. Srivatsa
SYM II-4 Fish-marketing & financing in Australia by the Commonwealth Fisheries Office, Sydney, Australia
SYM II-5 The Hong Kong fish-marketing scheme by the Department of Agriculture, Fisheries & Forestry
SYM II-6 A preliminary report on Lanmadaw Fresh Fish Market, by U Ba Kyaw .

CONTRIBUTED PUBLICATIONS

Note :—The following contributed publications were available in limited numbers only.

C/C54/CP 1 Fundamental studies on the fish lamp, by N. Y. Kawamoto (Eighth Pacific Science Congress, Manila, 1953)
CP 2 On the circulation in the North Pacific in relation to pelagic fisheries, by M. Uda (Eighth Pacific Science Congress, Manila, Philippines, 1953)
CP 3 Oceanographical and Fisheries research in India, by N. K. Panikkar (Eighth Pacific Science Congress, Manila, Philippines, 1953)
CP 4 Studies on agar-agar in Japan, by T. Yanagawa and K. Tanii (Eighth Pacific Science Congress, Manila, Philippines, 1953)
CP 5 Fish Preservation in South-east Asia, by A. G. van Veen (Advances in Food Research, Vol. IV, 1953)
CP 6 Some aspects of the primary productivity of the sea, by H. U. Sverdrup (FAO Fisheries Bulletin, Vol. 5, No. 6, 1952)
CP 7 Studies on *Tilapia mossambica* Peters (ikan mudjair) in Indonesia, by K. F. Vaas and A. E. Hofstede (Contribution No. 1 of the Inland Fisheries Research Stations, Djakarta-Bogor, Indonesia, 1952)
CP 8 Notes on the water hyacinth in Indonesia and its eradication by spraying with 2, 4-D by K. F. Vaas (Contribution No. 120, General Agricultural Research Station, Bogor, Indonesia, 1951)
CP 9 General Fisheries Council for the Mediterranean Summary Report (Résumé of the Proceedings), 2nd Meeting, Rome, 26-29 October, 1953 (mimeo document P. 53/CGPM/22)
CP 10 UNESCO Marine Biology chart No. 1—Mollusca, by M. W. F. Tweedie, Raffles Museum, Singapore (UNESCO Science Co-operation Office for S.E.A., 1953)
CP 11 UNESCO Marine Biology chart No. 2—Phylum Arthropoda class Crustacea, by M. W. F. Tweedie, Raffles Museum, Singapore (UNESCO Science Co-operation Office for S.E.A., 1953)
CP 12 The Culture of Tilapia in rice paddies in Taiwan, by Tung-Pai Chen (Chinese-American Joint Commission on Rural Reconstruction, Fisheries Series : No. 2, Taiwan, China, 1953)
CP 13 Fisheries Statistics of the Philippines, 1952, by J. R. Montilla & C. R. Dimen (Republic of the Philippines, Dept. of Agriculture & Natural Resources, Bureau of Fisheries, Manila, 1953)
CP 14 Reprint—Observations on the fish and fisheries of the Damodar Basin with reference to the multipurpose projects of the Valley, by T. J. Job and M. P. Motwani (Journal of the Asiatic Society Science, Vol. 18, No. 2, 1952)
CP 15 Fisheries Statistics Pakistan—Investigation Report No. 3—Statistics relating to Fisheries in the Karachi area for 1951, 15 Aug., 1952—Central Fisheries Dept., Govt. of Pakistan, Karachi.
CP 16 Government of Pakistan, Ministry of Food & Agriculture, Central Fisheries Dept.— Investigation Report No. 4—Fisheries of the Makran Coa t, 1953.
CP 16a Fisheries of Makran Coast, by M. R. Qureshi. Reprint from Agriculture Pakistan, Vol. III, No. 4, 1952
CP 17 Production, marketing & distribution of Fish, Mimeo Document C53/15 Conference of FAO, seventh session, 23 Nov. 1953
CP 18 Report of the Fisheries Panel—Mimeo Document C53/11/13—Conference of FAO, seventh session, 23 Nov. 1953
CP 19 A general account on the Fisheries of Thailand—Dept. of Fisheries, Ministry of Agriculture, Jan., 1954, Bangkok.
CP 20 General Fisheries Council for the Mediterranean, Proceedings and Technical Papers—1st Meeting Rhodes, 1952
CP 21 Fish Trade in Pakistan by M. R. Qureshi & M. Ahmad—Reprint—" Agriculture Pakistan ", Vol. III(3)
CP 22 Fisheries Resources of Sind, by M. R. Qureshi and S. A. Jaleel—Reprint—" Co-operation & Marketing Review ", Vol. VI(3)
CP 23 Preliminary charts of the mean salinity of the Indonesian Archipelago and adjacent waters, by P. Ch Veen, O.S.R. Bull. 17, July 1953

CP 24 Map of Hong Kong Fishing Industry, 1953
CP 25 Some aspects of productivity in relation to fisheries of Indian neritic waters, by N. K. Panikkar Jayaraman
CP 26 Some aspects of adaptation in Chanos chanos (Forskal), by N. K. Panikkar, P. R. S. Tampi a Viswanathan
CP 27 Fisheries Research in India, Part I, by N. K. Panikkar
CP 28 Fish Trapping in India, by T. J. Job & V. R. Pantulu—Journ. Asiatic Society Science, Vol. XIX, 1953
CP 29 Information on the activities of the Fish Marketing Organization, Thailand

INCIDENTAL PAPERS

IPFC/C54/INC 1 Notes on conference arrangements for the information of delegates
INC 2 Interim list of technical papers (up to 20th October, 1953)
2 rev. 1 Technical Papers
2 rev. 2 List of Papers issued
2 rev. 3 Complete List of papers issued
INC 3 Tentative fifth meeting programme
3 rev. 1 Provisional fifth meeting programme
3 rev. 2 Fifth Meeting programme
INC 4 Provisional List of delegates & observers
4 rev. 1. List of delegates & observers
INC 5 Programme—Plankton Symposium I—Jan. 25, 1954

MINUTES

IPFC/C54/M 1 Minutes of full Council Session No. 1, Monday 25 January, 1954, Morning session
M 2 Minutes of full Council Session No. 2, Tuesday 26 January, 1954, Afternoon session
M 3 Minutes of full Council Session No. 3, Wednesday 27 January, 1954, Morning session
M 4 Minutes of full Council Session No. 4, Thursday 28 January, 1954, Morning session
M 5 Minutes of full Council Session No. 5, Saturday 30 January, 1954, Morning session
M 6 Minutes of full Council Session No. 6, Monday 1 February, 1954, Morning session
M 7 Minutes of full Council Session No. 7, Wednesday 3 Feburary, 1954, Morning session
M 8 Minutes of full Council Session No. 8, Wednesday 3 February, 1954, Afternoon session
M 9 Minutes of full Council Session No. 9, Thursday 4 Feburary, 1954, Morning session
M 10 Minutes of full Council Session No. 10, Friday 5 February, 1954, Morning session.

IPFC PUBLICATIONS

1. Indo-Pacific Fisheries Council, Proceedings 4th Meeting, Quezon City, Republic of the Philippines, 23rd —7th November, 1952, Section I
2. Indo-Pacific Fisheries Council, Proceedings 4th Meeting, Quezon City, Republic of the Philippines, 23rd —7th November, 1952, Section II
3. Indo-Pacific Fisheries Council, Agreement, Rules of Procedure and Terms of Reference of Technical mittees, revised January, 1954
4. Indo-Pacific Fisheries Council, 5th Meeting, January 22—February 5, 1954, Bangkok, Thailand—Guid for Delegates
5. Indo-Pacific Fisheries Council, 5th Meeting, January 22—February 5, 1954, Bangkok, Thailand—Abst Technical & Symposium papers
6. Indo-Pacific Fisheries Council, List of Scientific & other periodicals published in the Indo-Pacific area—2 edition (revised) Bangkok, 1953
7. Indo-Pacific Fisheries Council, Special Publication 2—Fish Culture in Indonesia, by A. E. Hofstede, R. Ardiwinata & F. Botke, 1953

EXTEMPORE PAPERS

IPFC/C54/X-1 Submission, by Thai Government
X-2 Submission, by the Japanese Government—Facilities available in Japan for Training & Study for Fell & Scholars from abroad in the field of Fisheries

PRESS

IPFC/C54/P 1 Address of welcome, by His Excellency Field-Marshal P. Pibulsonggram
P 2 Address of welcome, by His Excellency Field-Marshal Phin Chunavan, Minister of Agriculture
P 3 Reply to the address of the Minister of Agriculture, by Monsieur R. Serene, Chairman IPFC
P 4 Opening Statements of Delegates

LIST OF DELEGATES AND OBSERVERS

ber Governments	*Name*	*Designation*	*Address*
STRALIA	Mr. F. F. Anderson (Delegate)	Director	Fisheries Division, Commonwealth Fisheries Office, Dept. of Commerce & Agriculture, Box 2595 GPO, Sydney, N.S.W., Australia.
	Mr. P. N. B. Hutton (Alternate)	3rd Secretary	Australian Legation, Bangkok, Thailand.
RMA	U Ba Kyaw (Delegate)	Fisheries Officer	Fisheries Bureau, Shafraz Road, Rangoon, Burma.
	U Thike Tun (Adviser)	Managing Director	Burma Sea Fisheries Ltd., 57-59 Barr Street, Rangoon, Burma.
ANCE	Mons. R. Serene (Delegate)	Director	Oceanographic Institute, Nha Trang, Vietnam.
	Mons. M. P. Legand (Alternate)	Chief	Laboratoire d'Oceanographie de l'Institut Francaise d'Oceanie (l'Office Francais de la Recherche Scientifique d'Outre-Mer), Noumea, New Caledonia.
	Mons. M. Cadoul (Adviser)	3rd Secretary	French Embassy, Bangkok, Thailand.
DIA	Dr. N. K. Panikkar (Delegate)	Chief Research Officer	Central Marine Fisheries Research Station, Mandapam Camp, P.O., S. Rly., S. India.
	Mr. T. V. R. Pillay (Adviser)	Assistant Research Officer	Hilsa Fish Enquiry—All India Institute of Hygiene & Public Health, 110 Chittaranjan Avenue, Calcutta 12, India.
DONESIA	Mr. G. M. Charidjie Kasuma (Delegate)	Chief	Social-Economic Div., Sea Fisheries Dept., Ministry of Agriculture, Djakarta, Kotai, Indonesia, Djalan Kerapue 2.
	Mr. Hasanuddin Saanin (Alternate)	Chief	Laboratory for Inland Fisheries, Tjikeumeuh 58, Bogor, Java, Indonesia.
PAN	Mr. K. Kuronuma (Delegate)	Chief	Freshwater Fisheries Research Laboratory, Ministry of Agriculture & Forestry, Hinomachi, Tokyo, Japan.
	Mr. A. Futagoishi (Alternate)	Third Secretary (Agricultural)	Embassy of Japan, Bangkok, Thailand.
REA	Mr. Soon Kyo Kim (Delegate)	Chief	Second Section, Political Bureau, Ministry of Foreign Affairs, Seoul, Korea.
	Mr. Jeung Keun Han (Alternrte)	Chief of Food Processing Section	Bureau of Fisheries, Ministry of Commerce & Industry, R.O.K. Government Seoul, Korea.
THERLANDS	Mr. C. J. Bottemanne (Delegate)	Fisheries Adviser to the Netherlands Ministry for Overseas territories	Westeinde 134, Voorburg, Netherlands.
	Mr. D. C. Zwollo (Alternate)	Chief, Fisheries Division	Dept. of Economic & Technical Affairs, Hollandia, New Guinea.
KISTAN	Dr. M. R. Qureshi (Delegate)	Director	Central Fisheries Dept., Nusserwanjee Building, Government of Pakistan, Dundas Street, Karachi 3, Pakistan.
HAILAND	Mr. Boon Indrambarya (Delegate)	Director General	Department of Fisheries, Bangkok, Thailand.
	Prince Laksnakara Kasemsanta (Alternate)	Agricultural Expert	Department of Agriculture, Bangkok, Thailand
	Major-General Mom Snidvongsseni (Adviser)	Manager	Thai Fish Co., Ltd., Bangkok, Thailand.
	Captain Sanith Mahagita, R.N. (Adviser)	Deputy Director	Naval Hydrography Dept., Ministry of Defence, Bangkok, Thailand.
	Mr. Chote Suvatti (Adviser)	Chief	Agriculture Division, Dept. of Fisheries, Bangkok, Thailand
	Mr. Prida Karnasut (Adviser)	Acting Chief	Division of Fish Culture, Dept. of Fisheries, Bangkok, Thailand.
	Mr. Sawang Charernphol (Adviser)	Chief	Marine Fisheries Experimental Station, Dept. of Fisheries, Bangkok, Thailand.

Member Governments	*Name*	*Designation*	*Address*
UNITED KINGDOM	Mr. D. W. La Mare (Delegate)	Director of Fisheries	H.Q. Fisheries Dept., Federa Malaya & Singapore, Pena
	Mr. J. A. Tubb (Alternate)	Reader in Marine Biology	Dept. of Biology, University of Kong, Hong Kong.
	Mr. Tham Ah Kow (Adviser)	Fisheries Research Officer	Fisheries Division, Dept. of merce & Industry, P.O. Bo Singapore.
	Mr. Au Lai Shing (Adviser)	Assistant Fisheries Officer	Dept. of Agriculture Fishe Forestry, Kom Tsun Laichikok, Kowloon, Hong
U.S.A.	Mr. P. E. Thompson (Delegate)	Supervisory Fishery Research Biologist	U.S. Fish & Wildlife Service, ington D.C. 25, U.S.A.
	Mr. J. E. King (Alternate)	Fisheries Research Biologist	P.O.F.I., Fish & Wildlife Box 3830, Honolulu, Hawa
	Mr. M. J. Lobell (Adviser)	Fisheries Specialist	FOA (USA), 274 Samson Bangkok, Thailand
	Mr. C. M. Adams (Adviser)	Fisheries Adviser	FOA (USA), c/o American E Taipei, Taiwan.
	Mr. L. S. Christey (Adviser)	Fisheries Adviser	FOA (USA), c/o American E Karachi, Pakistan.
	Dr. C. J. Fish (Adviser)	Director & Professor of Marine Biology	Narragansett Marine Laborato University of Rhode Isla Kingston, Rhode Island, U.
	Mr. E. M. Dahlgren (Adviser)	Technical Adviser (Fisheries)	FOA (USA), c/o American E Djakarta, Indonesia.
	Mr. O. L. Heggem	Fisheries Adviser	FOA (USA), c/o American E New Delhi, India.
VIET NAM	Mons. Tran Van Tri (Delegate)	Inspecteur des Peches	Direction de la Navigation, M de Travaux Publics, Vietnam.
	Mons. Nguyen Nhu Nghi (Alternate)	Chief	Service des peches au Nord-V Hanoi, Vietnam.
	Mons. Cao Thien Buu (Adviser)	Controleur des Eaux et Forets	Direction des Eaux et For Viet Nam, Saigon, Viet Na
Observer Organizations & Non-Member Governments			
LAOS	Mons. Nouthak Sithimolada	Director	Service des Eaux et Forets a Vientiane, Laos.
PORTUGAL	Dr. Jose Taveira	Charge d'Affaires	Portuguese Legation, 26 Bus Bangkok, Thailand.
UNO (ECAFE)	Dr. Shen-yi	Chief, Bureau of Flood Control and Water Resources Development	ECAFE, Paruskawan Palace, damnern Road, Bangkok, T
UNESCO	Dr. A. Wolsky	Chief	UNESCO S.E.Asia Scienc operation Office, Djalan negoro 76, Djakarta, In
SPC	(Mons. M. P. Legand) (Alternate)	Chief	Laboratoire d'Oceanographie stitut Francaise d'Oceanie Francais de la Recherche fique d'Outre-Mer), Noume Caledonia.
UNESCO Grantees			
(INDIA)	Mr. K. H. Alikunhi	Research Officer	Central Inland Fisheries. I Station, Old Mint Building Strand Road, Calcutta, Ind
(INDONESIA)	Dr. K. F. Vaas	Adviser	Laboratory for Inland F Taikeumeuh 58, Bogor Indonesia.
(GERMANY)	Professor A. Thienemanna	Director of Hydrobiology	Hydrobiologische Anshalt de Planck-Gesellschaft, Plon,
(U.S.A.)	(Dr. C. J. Fish)	Director & Professor of Marine Biology	Narragansett Marine Lab University of Rhode Kingston, Rhode Is., U.S.
Visitors	Mr. G. M. Taggart	Chief	Fisheries Dept., United Stat Administration of Ryuk USCAR, Okinawa APO-- P. M. San Francisco, C U.S.A.

Name	*Designation*	*Address*
Mr. W. H. L. Allsopp	Fishery Officer	Dept. of Agriculture, Georgetown, British Guiana.
Mrs. M. P. Fish	Biological Oceanographer	Narragansett Marine Laboratory, University of Rhode Island, Kingston, Rhode Is., U.S.A.
Mr. W. H. Cummings	Regional Representative of the Director-General, FAO	FAO Regional Office for Asia & the Far East, Maliwan Mansion Phra Atit Road, Bangkok, Thailand.
Mr. M. L. J. Kambhu	Regional Administrative Officer	,, ,,
C Secretariat		
Dr. C. Miles	Secretary, Indo-Pacific Fisheries Council	Regional Fisheries Officer, FAO Regional Office for Asia & the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
Dr. E. Hess	Technical Secretary	Chief, Technology Branch, Fisheries Division, FAO, Viale delle Terme di Caracalla, Rome, Italy.
Dr. T. J. Job	Technical Secretary	Assistant Regional Fisheries Officer, FAO, Bangkok, Thailand.
Dr. S. W. Ling	Technical Secretary	FAO/ETAP Fish Culturist. Fisheries Dept., Ministry of Agriculture, Bangkok, Thailand.
Mr. C. L. Coltman	Regional Information Officer	FAO, Bangkok, Thailand.
Miss A. Jiannee	Conference Officer	Technical Assistant, Fisheries Division, FAO Regional Office for Asia & the Far East, Maliwan Mansion, Phra Atit Road, Bangkok, Thailand.
Dr. Phit Panyalakshana	Interpreter	Ministry of Agriculture, Bangkok, Thailand
Nai Prayote Puranasiri	Chief of Personnel	Ministry of Agriculture, Bangkok, Thailand.
Nai Swasdi Thiemmedh	Liaison Officer	Dept. of Fisheries, Bangkok, Thailand.
Nai Vibul Sthitirat	Liaison	Ministry of Agriculture, Bangkok, Thailand.
Prince Kosolsuriyathit Suriyong	Reception & Information Unit	Dept. of Fisheries, Bangkok, Thailand.
Nai Thuanthai Bumradarinpai	,, ,,	,, ,,
Nai Cherdchai Amartayakul	,, ,,	,, ,,
Nai Swing Suwanaron	,, ,,	,, ,,
Nai Sawaeng Kulthongkham	Registration Unit	Ministry of Agriculture, Bangkok, Thailand.
Nai Amporn Karasnan	,, ,,	,, ,,
Nai Vibul Sthitirat	Transportation	,, ,,
Nai Chanid Purnapura	,, ,,	Department of Fisheries, Bangkok, Thailand.
Nai Chavalit Cheunbandu	,, ,,	Ministry of Agriculture, Bangkok, Thailand.
Nai Pratuang Saiyaphant	Documents Unit	Ministry of Agriculture Bangkok, Thailand.
Miss Vimonnart Pradipasena	,, ,,	,, ,,

ADDRESSES OF MEMBERS OF COMMITTEES, NOT MEMBERS OF DELEGATIONS

Ahmed Nazir	Deputy Director of Fisheries, Comilla, East Bengal, Pakistan.
Ashraf Ali	Deputy Director (Technology), Directorate of Fisheries, Comilla, Pakistan.
Bhatia, D.	Deputy Fisheries Development Adviser, Ministry of Food & Agriculture, New Delhi
Bhimachar, B. S.	Fishery Biologist, Central Inland Fisheries Research Station, Old Mint Building Strand Road, Calcutta 7, India.
Blackburn, M.	Fisheries Division, C.S.I.R.O. Marine Biological Laboratory, Cronulla, N.S.W., Au
Chang Chung Hyun	Pusan Fisheries Experiment Station, Pusan, Korea.
Chee Choul Keun	Bureau of Fisheries, Ministry of Commerce & Industry, Seoul, Korea.
Cherdchai Amatayakul	Department of Fisheries, Bangkok, Thailand.
Chun Chan Il	Pusan Fisheries College, Pusan, Korea.
Chung Moon Ki	Chief, The Central Fisheries Inspection Station, Ministry of Commerce and In Pusan, Korea.
Domantay, J. S.	Ichthyologist, Fishery District No. X, Zamboanga City, Philippines.
Fujinaga, M.	Chief, Research Division, Fisheries Agency, 2-2 Kasumiguseki, Chiyoda-ku, Tokyo,
Gorazdowski, T.	Fisheries Officer, Department of Agriculture, Fisheries & Forestry, Kom Tsun Laichikok, Kowloon, Hong Kong.
Jinda Thiemmedh	Department of Fisheries, Bangkok, Thailand.
Jones, S.	Central Marine Fisheries Research Station, West Hill, Malabar, South India.
Kartono, R. A.	Inspectur Perikanan Laut Indonesia, Timor, Makassar, Indonesia.
Kerns, F. J.	Fisheries Division, Department of Commerce & Agriculture, Box 2595, G.P.O., S Australia.
Kosol Suriyong	Department of Fisheries, Bangkok, Thailand.
Mardjoko, R.	c/o Djawatan Perikanan Darat, Daerah Surabaia dan Madura, Surabaia, Indonesia
Manacop, P. R.	Fishery Biologist, Philippine Institute of Fisheries Technology, Bureau of Fi Manila, Philippines.
Mitra, G. N.	Deputy Director of Fisheries, Cuttack, Orissa, India.
Montalban, H. R.	Chief, Division of Fish Culture & Fisheries Biology, Bureau of Fisheries, Philippines.
Montilla, J. R.	Chief, Division of Commercial Fisheries, Bureau of Fisheries, Manila, Philippine
Nakai, Z.	Chief Biologist, Sardine Resources Division, Tokai Regional Fisheries Research Lab Chuo-ku, Tokyo, Japan.
Nam Sang Kyu	Korea Fisheries Experimental Station, Pusan, Korea.
Nicholls, A. G.	Fisheries Division, C.S.I.R.O. Marine Biological Laboratory, Cronulla, N Australia.
Niven, D. R.	H.Q. Fisheries Department, Penang, Malaya.
Oka, H.	Fisheries Agency, 2-2 Kasumigaseki, Chiyoda-ku, Tokyo, Japan.
Pattinassarany, A. J.	Peminpin, Perikanan Laut, Ambar, Indonesia.
Rabanal, H. R.	Fish Culturist, Bureau of Fisheries, Manila, Philippines.
Rochford, D. J.	Hydrologist, Division of Fisheries, C.S.I.R.O. Marine Biological Laboratory. Ci N.S.W., Australia.
Rotschi, H.	Laborature d'oceanographie, Institut Francais d'Oceanie, Noumea, New Caledoni
Royce, W. F.	Pacific Oceanic Fishery Investigations, P.O. Box 3830, Honolulu, Hawaii.
Sachlan, M.	Assistant Fisheries Officer, Laboratory of Inland Fisheries, General Agricultural R Station, Tjikeumeuh, 99, Bogor-Djawa, Indonesia.
Saha, K. C.	Director of Fisheries, Writers' Building, Calcutta, India.
Sant Banthukul	Department of Fisheries, Bangkok, Thailand.
Setna, S. B.	Office of the Director of Fisheries, Taraporevala Aquarium, Bombay, India.
Sulit, J. I.	Bureau of Fisheries, Manila, Philippines.
Takayama, S.	Tokai Fisheries Regional Fisheries Research Laboratory, Tsukishima, Chuo-ku, Japan.
Thompson, H.	Chief, Division of Fisheries, C.S.I.R.O. Marine Biological Laboratory, Cronulla, N Australia.
Thomson, J. M.	Fisheries Division, C.S.I.R.O. Marine Biological Laboratory, Cronulla, N Australia.
Thuanthai Bumradarinpai	Department of Fisheries, Bangkok, Thailand.
Umali, A. F.	Ichthyologist, National Museum, Manila, Philippines.
Vickery, J. R.	Chief, Food Technology Division, C.S.I.R.O., Homebush, New South Wales, Aust
Watari, S.	Fisheries Agency, 2-2 Kasumigaseki, Chiyoda-ku, Tokyo, Japan.

COUNCIL CORRESPONDENTS

Country	*Administrative Correspondent*	*Bibliographic Correspondent*
ralia	Secretary, Dept. of External Affairs, Canberra.	Mrs. L. M. Willings, CSIRO Marine Biological Laboratory, Cronulla, N.S.W.
ıa	Secretary, Ministry of Agriculture & Forestry, Union of Burma, Rangoon.	U Ba Kyaw, Fisheries Bureau, Shafraz Road, Rangoon.
bodia	Monsieur Dom Saveun, Cantonnement des Peches de Phnom Penh, Service des Eaux, Forets, Chasse & Peches, Phnom Penh.	Directeur, Direction des Eaux et Forets du Cambodge (Section Recherche Piscicole du Petit-Takee, Phnom Penh)
on	Mr. E. R. A. de Zylva, Fisheries Research Station, P.O. Box No. 531, Colombo	Mr. E. R. A. de Zylva, Fisheries Research Station, P.O. Box 531, Colombo.
ce	Monsieur R. Serene, Institut Oceanographique de Nha Trang, Nha Trang, Viet Nam.	Monsieur R. Serene, Institut Oceanographique de Nha Trang, Nha Trang, Viet Nam.
ı	Dr. B. N. Chopra, Ministry of Food and Agriculture, New Delhi.	Dr. C. P. Gnanamuthu, University of Madras, Triplicane, P.O., Madras.
nesia	Mr. G. M. C. Kasuma, Socio-economics Division, Sea Fisheries Department, Ministry of Agriculture, Djakarta.	Mr. Hasanuddin, Saanin, Laboratory of Inland Fisheries, General Agricultural Research Station, Tjikeumeuh 99, Bogor.
n	Mr. F. Togo, Bureau of Economic Affairs, Ministry of Foreign Affairs, Tokyo.	Mr. K. Kuronuma, Chief, Freshwater Fisheries Research Laboratory, Ministry of Agriculture and Forestry, Hinomachi, Tokyo.
a	Mr. Chee Choul Keun, Director of Bureau of Fisheries, Ministry of Commerce & Industry, Pusan.	Mr. Chang Chung Hyun, National Fisheries Experimental Station, Pusan.
erlands	Mr. D. C. Zwollo, Fisheries Division Dept. of Economic & Technical Affairs, Hollandia, Netherlands, New Guinea.	Mr. D. C. Zwollo, Fisheries Division Dept. of Economic & Technical Affairs, Hollandia, Netherlands, New Guinea.
tan	Dr. M. R. Qureshi, Central Fisheries Department, Dundas Street, Karachi.	Dr. A. H. Qadri, Department of Zoology, University of Karachi, Karachi.
ppines	Mr. Claro Martin, Bureau of Fisheries, Manila.	Mr. H. R. Montalban, Bureau of Fisheries, Manila.
land	Mr. Boon Indrambarya, Department of Fisheries, Bangkok.	Mr. Boon Indrambarya, Department of Fisheries, Bangkok.
(for Federan of Malaya, ngapore, North rneo, and rawak)	Mr. T. F. Brenchley, Office of Commissioner-General of U.K. for S.E. Asia, Phoenix Park, Singapore.	Mr. D. W. Le Mare, Director of Fisheries, H.Q. Fisheries Department, Penang.
r Hongkong)	Director, Department of Agriculture, Fisheries & Forestry, Hongkong.	Director, Department of Agriculture, Fisheries & Forestry, Hongkong.
A.	Mr. O. E. Sette, Pacific Oceanic Fishery Investigations, Honolulu.	Mr. O. E. Sette, Pacific Oceanic Fishery Investigations, Honolulu.
Nam	Monsieur Tran Van Tri, Direction de la Navigation, Ministere de Travaux Publics, Saigon.	Monsieur Cao Thien Buu, Direction des Eaux et Forets, 200 rue Testard, Saigon.

PANELS OF TECHNICAL COMMITTEES

In accordance with the procedural practice adopted at this Meeting, six panels were appointed to deal n the technical aspects of the fisheries problems both at the Meeting and during the ensuing period as ows :—

PANELS OF TECHNICAL COMMITTEE I

Country	*Panel "A"* (Inland Fisheries)	*Panel "B"* (Sea Fisheries)	*Panel "C"* (Miscellaneous Fisheries and General Biology)
Australia	A. G. Nicholls	J. M. Thomson	D. J. Rochford
Burma	..	U Ba Kyaw	..
France	R. Serene	M. P. Legand	H. Rotschi.
India	B. S. Bhimachar	S. Jones	N. K. Panikkar.
Indonesia	Hasanuddin Saanin	A. J. Pattinassarany	M. Sachlan.
Japan	K. Kuronuma (*Chairman*)	Z. Nakai	M. Fujinaga
Korea	C. Chung Hyun	Chee Choul Keun	Chun Chan Il.
Netherlands	..	D. C. Zwollo	..
Pakistan	N. Ahmad	M. R. Qureshi	M. R. Qureshi.
Philippines	H. R. Rabanal	P. R. Manacop	J. S. Domantay
Thailand	Prida Karnasut	Thuanthai Bumradarinpai	Cherdchai Amartayakul.
United Kingdom	J. A. Tubb	Tham Ah Kow	Tham Ah Kow (*Chairman*)
U.S.A.	..	E. H. Dhalgren (*Chairman*)	J. E. King.
Vietnam	Cao Thien Buu	Nguyen Nhu Nghi	..

Sub-Committee on Chanos

India	N. K. Panikkar.
Indonesia	R. Mardjoko.
Korea	Chung Moon Ki.
Thailand	Jinda Thiemmedh.
Vietnam	Cao-Thien-Buu
Philippines	H. R. Rabanal (Rapporteur)

Sub-Committee on Hilsa

Burma	U Ba Kyaw.
Pakistan	Nazir Ahmad.
,,	M. R. Qureshi.
*India**	T. V. R. Pillay (Rapporteur).

*One more person will be nominated later.

Sub-Committee on *Rastrelliger*.

It was resolved that interested Member Countries should be requested to nominate members.

PANELS OF TECHNICAL COMMITTEE II

Country	*Panel "A"* (Craft & Gear)	*Panel "B"* (Food Technology)	*Panel "C"* (Socio-economics & Statistics)
Australia	F. F. Anderson	J. Vickery	F. J. Kearns.
Burma	U Ba Kyaw	..	U Ba Kyaw.
France	..	..	..
India	S. B. Setna	K. C. Saha	G. N. Mitra.
Indonesia	R. A. Kartono	..	G. M. C. Kasuma.
Japan	S. Takayama	S. Watari	H. Oka.
Korea	Nam Sang Kyu	Chung Moon Ki	Jeung Keun Han.
Netherlands	C. J. Bottemanne	..	C. J. Bottemanne
Pakistan	M. R. Qureshi	Ashraf Ali	M. R. Qureshi.
Philippines	A. F. Umali	J. I. Sulit	J. R. Montilla
Thailand	S. Charernphol	Prince Kosol Suriyong	Sant Bandhukul
U.K.	T. Gorazdowski	D. R. Niven	D. W. Le Mare (*Chairman*).
U.S.A.	M. J. Lobell (*Chairman*)	C. M. Adams	L. S. Christey.
Vietnam	Tran Van Tri	..	Tran Van Tri.

The full PROCEEDINGS of this Meeting consist of two sections of which the first, Report of Proceedings, is contained in this issue. Section II comprises the Technical Papers presented at the Meeting by Delegations and the Papers read at a Symposium on Fish Marketing. The papers presented at a Symposium on Plankton sponsored jointly with the UNESCO will be published separately.

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